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The Nine-Hour Day.

The nine-hour day question seems to be attracting more attention in machinery circles just now than any other. The International Association of Machinists is leading the struggle for the shorter day; but, its officers claim, will have the support of most of those who are not included in the organization. On behalf of the movement the men claim that improvements in machinery have gone on until the productive power of labor is now far greater than it was when the working day was reduced from eleven or twelve hours to ten. That with nine hours labor per day the product of a workman will still be far more than it was a few years ago at ten hours per day; that this great productive capacity has so far gone chiefly to reduce the cost of work done while the men who do the work are not materially better off—work for about the same wages, have to work as many hours and pay higher rents for equal accommodation. They claim that they should share in the benefits of the improvements made, and that when the nine-hour day is adopted things will adjust themselves to that basis and we shall go along as well as we do at present on a ten-hour basis.

The claim is also made by some that production will not be materially lessened, and in some kinds of work will be fully as much per day of nine hours as per day of ten hours, but this claim seems to be offset by the other claim that the nine-hour day will call for the employment of a greater number of men, and thus reduce the number of idle men whose efforts to secure places tend to depress wages.

Most employers, we believe, agree that nine hours per day, or even eight hours are enough for a man to work and wish that the shorter day was established, but, taking them individually, those who are engaged, as many of them are, in lines of business in which competition is strong and the margin of profit close, do not see how a shortening of the day, which is to materially increase their costs, can be borne, unless all their competitors are to be placed upon the same basis, and in most instances there is no assurance of this.

Of course, it is true that this same condition had to be confronted when the present ten-hour day was proposed and was looked upon as a very short one, and it is clear enough that if no shortening of the day could ever take place until every manufacturer was agreed to it, arguments in favor of the shorter day would be in vain and ten hours a day would remain the standard forever. If all the employers on one side and all the workmen on the other could be united, they could more easily bring about any desired reform, or at least give it a fair trial, but as this is not the condition we see no way for it but to join the issue and see how it comes out. There will, we suppose, be friction, but we hope it will be useful friction, and not that which only irritates and leaves its cause still existing, i. e., the question still undecided, and to be settled one way or the other by a future struggle. The railroad companies employ a large percentage of the machinists of the country, and we venture to predict that if the men employed by them secure the nine-hour day it will not materially affect the prices of stocks in Wall street, while if the work turned out per man per day is materially lessened, the demand for machine tools, etc, caused thereby, will be a good thing for other branches of the machine trade.

It Pays.

When the things done by the National Cash Register Company, of Dayton, Ohio, are referred to it is quite common for other manufacturers to say, "Yes, I suppose that is all right for them. They have a monopoly of all the cash register business and can get the profits that enable them to indulge in such frills. We can't do it in our business; competition is too keen." The Patterson brothers have steadily maintained that these features by which this factory is made much more attractive than ordinary work shops *paid* in dollars and cents, but some of the skeptical ones have been slow to believe this, saying that nothing could prove that it paid until the test of working under strictly competitive conditions had been applied to it. We are beginning now to get the testimony of men who do things along similar lines in factories that are engaged in strictly competitive business, and it is gratifying to see that these men also find that it pays. Drop forgings, for instance, are manufactured under strictly competitive conditions, but as shown in Mr. Redfield's address, printed at page 393, it *pays*, in a strictly business sense, to give considerable attention and to spend considerable amounts of money in securing the utmost possible comfort for men who work at drop forging and to make them feel not only that their rights are regarded but that they are looked upon as important co-operatives in the success of the business and that their interests will be looked after so far as possible. Mr. Redfield's statement that they have never reduced piece work prices and do not consider it just or profitable to do so will be regarded by many—probably most—manufacturers as rather queer. But the deliberate statement of the experienced treasurer of an incorporated company doing a highly successful business under strictly competitive conditions is not to be despised; on the contrary it must be carefully considered by all who really believe in profiting by the experience of others. It is to be remembered too that this factory is carried on in the largest city of the world, next to London, under social conditions generally regarded as most unfavorable for continuously pleasant relations with employees. Virtually the same testimony is given by Mr. Sherwin of the Sherwin-Williams Co. of Cleveland; a company which manufactures paints, we presume also under competitive conditions. Mr. Sherwin most emphatically says that just, fair and liberal treatment of employees *pays* in dollars and cents and what he regards as just, fair and liberal treatment is far beyond anything conceived of by the average manufacturer.

As experience accumulates with what has come to be called "industrial betterment" it is being made clear that men who are at the head of industrial estab-

lishments cannot afford to disregard these matters any more than they can afford to disregard thorough lubrication and other proper care of machinery. Men are not machines and cannot profitably (to say nothing of the justice of the matter) be treated as machines. They must be treated as men in order to get the best possible results from modern industrial operations.

Ore Mines, Steel Makers and Railroads.

The stopping of work on the railroad proposed to be built by Andrew Carnegie to get his products to the seaboard independently of the Pennsylvania Railroad is what would be expected when it is remembered that by the formation of the giant steel trust the Pennsylvania road becomes really a part of the organization. The steel company is also reported to be securing control of iron ore properties to such an extent as to make it seem probable that it will be able to prevent outside companies from getting adequate supplies except from itself and it now looks as though this company could (whether it does or not) hold the steel-using industries of the country up for "all the traffic will bear" with no possibility of effective competition. Experience shows that the American people, even those of them who regard themselves as "shrewd business men" will stand an awful lot of squeezing before they will squeal and it will be interesting to watch the results of what is coming, only it will not be possible for the traditional "man up a tree" to watch the struggle because nobody apparently will be able to climb a tree; all must take part in the melee one way or another.

Manufacturers' Association of Bridgeport, Conn.

The manufacturers of Bridgeport, Conn., held a meeting Wednesday evening, April 10, and formed an association for mutual support and action in matters of common interest. They feel that they have not received the recognition they deserve on the part of the city government as regards fire protection and other matters, and the association is largely the outgrowth of this fact. We have been favored with a copy of the articles of association in which its objects are stated to be the holding of "stated meetings for the discussion of and deliberation upon matters of common interest to the manufacturers located in the city of Bridgeport and vicinity; to improve the general condition of the manufacturing interests in said city; to take united action as an association upon questions relating to the general condition of said manufacturing interest for the benefit of the association and of the component members thereof, such as the improvement of transportation facilities and rates, the obtaining of satisfactory action by the municipality of the city of Bridgeport upon public questions, in which the said association or its members are interested, with regard to fire protection, street lighting, the regulation and improvement and paving and care of the streets in said city, the improvement of transportation facilities for passengers and merchandise within the city, the establishment of suitable places of recreation, play grounds, gymnasiums, etc., for the benefit of employees, and such other matters as shall from time to time appear to be of benefit to the said association as a whole and its component members; to act as an association in arrangements and agreements for the purposes aforesaid and for such other purposes as may be for the benefit of the association, in arrangements or contracts with transportation companies, water companies, gas and electric light companies, and electrical power companies; and generally to do such other things as may be for the benefit of said association and of its members; and for the improvement of manufacturing conditions within the said city, so far as such arrangements may not be contrary to law, and generally to do all things incidental to the general purpose of the organization of this association."

It is also said to be "the general purpose of the association to act in co-operation with similar associations, formed or to be formed in other cities and towns in the State of Connecticut and ultimately in the cities and towns of New England and generally in the United States. The association will endeavor to the extent of its ability to bring about the formation of a State organization of manufacturers' associations with stated meetings or conventions and with delegates from the manufacturers' associations respectively under proper regulations of such State organization; and with the ultimate object of organizations in other States of corresponding character, with a view of having at stated times general conventions for the purpose of promoting the interests of manufacturers as aforesaid, not only in restricted localities but in the country at large."

The scope of the association will be seen to be broad enough to cover all classes of manufacturers and, as a matter of fact, we are informed that practically all the manufacturers of Bridgeport have already joined.

Technical Publications.

"Metal Statistics, 1900." 12 pages, 13x19½ inches, paper. New York: The Report Company, 61 Beekman street. Price, $1.

This is a series of tables of prices, stocks, production and supply of copper, tin, lead, spelter, aluminum and iron, covering a period of nearly fifty years.

"Engineering Practice and Theory for Steam Engines." By W. H. Wakeman. 184 5x7½-inch pages, with numerous illustrations. Published by the author, New Haven, Conn.

This is intended as an instruction book for engineers in charge of steam-power plants. It contains a good deal of information that such men need and that is presented in clear and intelligible language.

"A Treatise on the Construction and Use of Milling Machines Made by the Brown & Sharpe Mfg. Co." 230 6x9-inch pages. Providence, 1900: Brown & Sharpe Mfg. Co.

The present revised edition of this little classic of machine-tool literature embodies many improvements that have been made in the milling machines and attachments of the company since the appearance of the last previous edition. Among other changes we note that the machine which previous to 1900 was known as "No. 2 Vertical Spindle" is now designated "No. 5" of that type. For the benefit of such as may not already be familiar with this publication, we may explain that it is not to be classed as a catalog, but as a practical treatise upon the milling machine.

Some International Trade Opportunities.

A NEW SHIPYARD AT THE PORT OF FIUME.

A report from Austria states that the German shipbuilding company known as the "Howaldswerke," of Kiel, together with a leading Budapest Banking Institution, contemplate the erection of an extensive shipbuilding yard especially for war ships, in the port of Fiume, Hungary. The capital of the company is to be 20,000,000 crowns, or about $4,000,000. All the preliminary financial and technical questions have been arranged.

The Howaldswerke, of Kiel, is one of Germany's leading shipbuilding firms, and the contracts for the machines and tools required for the equipment of the new works at Fiume will probably be placed by this concern.

MACHINERY FOR SPAIN.

A German Consular report calls the attention of manufacturers to the demand for all kinds of machines and tools existing in Spain. It is especially pointed out that the following machines should find a ready sale: Agricultural machines and implements; machinery and apparatus for the beet sugar industry; typesetting, printing and bookbinding machinery; leather working and shoe machinery; ice making and refrigerating machinery. A good demand, the German Consul adds, exists for steam engines, which are now chiefly supplied by Great Britain, Germany, Belgium and France. Railroad rails, including iron and steel rails for narrow gage and electrical roads also find a good sale.

NEW LOCOMOTIVE WORKS IN BAVARIA.

A report from Munich is to the effect that the Krauss Locomotive Works, of

that city, have purchased a large tract of land near the Bohemian frontier for the purpose of erecting new extensive locomotive works there. It is said that the entire Munich plant will be removed to Weiden, a city situated on the Bavarian-Bohemian frontier, chiefly for the reason that by doing so the company will save at least 500,000 marks every year in the cost of the transportation of coal to Munich. The firm should be addressed as follows: Messrs. Krauss & Co., Locomotivfabrik, Munich, Germany.

LOCOMOTIVES FOR THE FRENCH RAILROADS ORDERED IN AUSTRIA.

American locomotive manufacturers should carefully watch the French market. Last autumn several large French railroad companies placed some orders with several Austrian locomotive works, and we are now informed that altogether forty-six engines were recently ordered from the Wiener Neustädter and the Floridsdorf Locomotive Works.

AGRICULTURAL MACHINERY FOR EGYPT.

The imports of all kinds of agricultural machinery into Egypt are steadily increasing. The British Consul at Alexandria, in a recent report, states that a special demand exists for threshing and corn-cleaning machinery, and that the farmers throughout the country begin to recognize the advantages derived from the use of modern machines and implements. There are quite a number of agricultural machinery depots in Alexandria and Cairo, mostly important and reliable firms, with whom correspondence should be opened.

NEW ELECTRICAL WORKS IN AUSTRIA.

We learn that the stock company "Societa Veneziano di Elettrochimica," whose headquarters are at Venice, Italy, has acquired a concession for the erection of a new plant in the vicinity of Trieste, in Austria. H. L. G.

Commercial Review.

NEW YORK, Monday, April 15.

ENGINES AND OTHER MACHINERY.

Engine trade continues excellent and compares well with last year's at this time. Enthusiastic reports are not uncommon. One concern which goes especially into engines for large electric work, remarks that while the closing of orders continues steadily, there is less inquiry of the speculative or projective type, and that this circumstance is a natural incident to the approach of summer. Yet reports in other quarters denote no lack of inquiry.

"There has not been such an inquiry in a year—for boilers especially," remarks one seller, "and the inquirers are not merely people who write for catalogs; they send men to look at the stuff. If we get one-tenth the amount of work that is in prospect we shall be well off for orders."

Boiler manufacturers have already been made aware of the existence of the Steel Trust by an advance in plates and boiler tubes.

Rumors of a combine in the engine trade which have been current at various times in the last few years, have cropped out again with the name of the E. P. Allis Company, of Milwaukee, most prominent. It is stated that Charles Allis has been in New York on business with the matter and that at the Milwaukee office it was admitted that the combination had been under consideration for some time, though denied that this company had given an option on its plant.

According to the story a trust with $50,000,000 capital and including 40 plants is in prospect, and the field covered is to extend into big machinery, quite far removed from Corliss engines or in fact from steam engines at all, but this is probably due to a confusion of ideas. There is practically nothing known about the matter at engine offices in the city, where inquiries have been made.

It is reported that the E. P. Allis Co., has been heard from in the market inquiring for tools. The company thus far is arranging for the construction of the big shops at its new plant one at a time. Work is about to begin on the first. The plan to build seven or eight seems to be still open to discussion. At any rate they have no early intention to abandon their old plant, which would require two years to duplicate.

The award of contracts for the tool equipment of the British Westinghouse Works is getting closer and will, it is now reported, probably take place in the next two weeks. Some of the parties who have put in bids are hovering around Pittsburgh, evidently wishing to be in close touch with the business when the contracts are let. It was stated this week that an engineer in charge of the work was about to start out and visit shops which had offered to furnish tools. We have a little piece of news which has come in a round about way but which is still worthy of some consideration, that by far the greater part of the contracts are destined to be placed with American firms.

While there have been comparatively few signs that the coming Pan-American Exposition at Buffalo is exciting the interest of tool builders, such a sign is seen in preparations that are being made for the display of tools of about ten manufacturers in Cincinnati and elsewhere, in charge of the Prentiss Tool & Supply Co., New York. They will have some 2,000 feet of space well located and the machines will be belted up for driving by a group motor. Among these manufacturers are the Cincinnati Milling Machine Co., Lodge & Shipley Machine Tool Co., Cincinnati Machine Tool Co., Bickford Drill & Tool Co., Cincinnati Planer Co., all of Cincinnati; Rogers & Hemphill Machine Co., Alfred, N. Y.; Acme Machine Screw Co., Hartford, Conn.; Fay & Scott, Dexter, Me., and George Juengst & Son, Croton Falls, N. Y.

A tool dealer in town remarks that while the market might at this time be expected to feel some effects from the threat of a machinist's strike this spring, no such result is perceptible in his own trade.

Machinery, Machines, and Parts of—	February— 1900 Number.	1900 Dollars.	1901 Number.	1901 Dollars.	Eight Months Ending February— 1899 Number.	1899 Dollars.	1900 Number.	1900 Dollars.	1901 Number.	1901 Dollars.
Cash Registers	....	60,346	1093	93,694	....		....	545,048	8277	651,267
Electrical	....	291,678	....	566,494	....	1,846,647	....	2,442,012	....	3,777,673
Laundry Machines	....	47,172	....	29,566	....		....	263,312	....	277,974
Metal-working	....	585,854	....	217,956	....	4,193,905	....	4,085,984	....	3,007,480
Printing Presses, and parts of	....	113,176	....	68,194	....	461,962	....	805,014	....	779,028
Pumps and Pumping Machinery	....	241,391	....	154,020	....	1,641,001	....	2,047,218	....	1,497,136
Sewing Machines, and parts of	....	345,272	....	306,397	....	1,881,553	....	2,902,139	....	2,827,652
Shoe Machinery	....	96,667	....	102,679	....	570,600	....	745,674	....	616,572
Steam Engines, and parts of—										
Fire	....		....		1	260	1	8,135	10	17,845
Locomotive	39	386,765	60	587,314	342	3,178,642	332	3,490,025	283	2,828,165
Stationary	108	33,953	96	29,898	317	195,209	739	420,013	802	583,406
Boilers and parts of Engines	....	80,615	....	94,462	....	783,683	....	1,136,557	....	1,202,903
Typewriting Machines, & parts of	....	213,156	....	217,412	....	1,374,468	....	1,726,142	....	1,785,821
All other Machinery, and parts of	....	1,661,778	....	1,153,868	....	12,049,618	....	13,734,217	....	14,690,057

UNITED STATES OFFICIAL STATISTICS OF EXPORTS OF MACHINERY OF DOMESTIC MANUFACTURE INCLUDING FEBRUARY, 1901.

There are some new and interesting machinery enterprises on foot. One of the most important is the construction of a large plant at Cleveland, O., by the Wellman-Seaver Engineering Company, the president of which is S. T. Wellman, elected president of the A. S. M. E. at its last meeting. The company's business is the designing and installation of iron and steel making machinery, etc., which it has heretofore had built by contract, but now proposes to build itself. The plant will comprise a 570x128 foot machine shop; a 100x100 foot blacksmith shop, a power house, 70x58 feet, a large pattern shop and warehouse. When complete the works will also include a 700x105 foot steel and iron foundry. An electrical power distribution system will be employed, using independent motors for the different machines largely. They will make charging machines, special cranes, open-hearth fittings, gas producers, metallurgical furnaces, machinery for handling ore and other materials, water-sealed reversing

valves, and many other parts of steel-making plants. The company has a large foreign business, and it is expected that some of the first products of the new plant will go to Japan and Spain.

It is reported that a new Westinghouse concern is being organized—the Westinghouse Friction Gear Company—for which a plant will be erected somewhere in the Pittsburg district, for the manufacture of friction draft gear for railroad cars.

A quantity of large machinery has been selected for a "Brainite" slag fertilizer plant to be built at Birmingham, Ala., or thereabouts, by Capt. John C. Brain. It will include a 2,000 horse-power Allis tandem compound engine, a battery of twenty-six Griffin mills each occupying eight feet of space, requiring thirty-five horse-power and together giving three tons an hour output; two 50-ton Gates roller crushers and other Gates rolls, and three Poole & Hunt mixers, each of which will require forty horse-power.

The Hooven, Owens & Rentschler Company, Hamilton, O., have on hand an order for four horizontal cross compound condensing engines of about 1,250 horse-power each, for the Columbus, Buckeye Lake & Newark and the Columbus, London & Springfield, two allied lines of railway in Ohio. These engines will be connected to General Electric Generators. For M. Guggenheim's Sons smelting plant at Perth Amboy, N. J., (which has just been transferred to the American Smelting and Refining Co.), they have an order for two horizontal cross compound condensing engines of 850 horse-power. Each will be direct connected to Crocker-Wheeler generators for electrolytic work. At the New York office of the Hooven, Owens & Rentschler Co., business is pronounced never better.

Woolston & Brew have closed contracts to furnish two Fisher engines, aggregating 2,300 horse-power, to the Passaic Rolling Mills, Paterson, N. J., and two C. H. Brown engines to the John B. Stetson (Hat) Co., Philadelphia.

A foundry to be operated under the name, Norwood Foundry Co., and intended primarily to serve the needs of the Bullock Electric Manufacturing Co., although it will take other work as well, is to put up a group of buildings at East Norwood, O., close to those of the Bullock Company and conforming to them in style. The foundry building proper will be 200x150 feet and equipped with three electric cranes, one of them 50 tons capacity, beside hand traveling and jib cranes. The foundry will be under the direction of Hoefinghoff & Laue, of Cincinnati.

A selling combination has been formed by the Bullock Electric Manufacturing Company, of Cincinnati, and the Wagner Electric Manufacturing Co., of St. Louis, their lines being of such a nature that they will supplement each other rather than conflict. The Bullock Company makes direct and alternating current machines, from a ½ horse-power motor to a 10,000 K. W. generator; controllers of various types and rotary transformers. The Bullock "teaser" power system for driving large daily newspaper presses is a specialty. The product of the Wagner Company covers static transformers of all types and of the largest sizes; ammeters, voltmeters, indicating wattmeters, switches, switchboards for all purposes and single phase self-starting alternating current motors. The sales organization will be managed by E. H. Abadie, formerly sales manager of the Wagner Company.

Vice and Acting Consul-General Westacott, of London, under date of March 16, 1901, reports that an inquiry has been made at that office for the names of firms manufacturing American coal-cutting machinery. Replies should be addressed to the United States Consulate-General, London.

There is a growing disposition in the Dominion of Canada to repeal the bounties offered on iron and steel.

It is reported that a decision of the test case on Russian sugar will be handed down by the United States General Appraisers' Board on Classification this week.

CHICAGO MACHINERY MARKET.

Trade in machine tools in the West presents some irregular phases. On the whole there is activity. Builders report a satisfactory business. With some selling agencies there is only moderate trade; with others a volume quite favorable in comparison with previous months and with the corresponding period of 1900. Business is largely of the "pick up" order, that is, sales of one or two machines only, but the big buying is not entirely lacking. The Texas Central and some other Western roads have placed good-sized orders and there are inquiries for still larger lots in the market, which, it is expected will be placed in the near future. Railroad buying of machinery as well as of betterments generally is on a much more liberal scale than last year. Most car builders are said to be sold up to next October, some for an even longer period.

Quite a few small repair machine shops are being started up in Western country towns, usually where no machine shop has heretofore existed. The proprietors are generally skilled mechanics who have saved a few hundred dollars and are going into business for themselves on a moderate scale, buying machinery from $500 to $1,500 in value, several often combining for that purpose. The present is regarded as a fortunate time for the launching of a small business of this kind.

Among the small shops at Chicago, where specialties are made, often in rented quarters, there is much moving in progress this spring, the motive often being the securing of larger space. Here too is a general disposition to increase shop equipment by the purchase of a machine or two, as occasion demands.

The Railway Supply Company reports a heavy business, some departments being sold up for four, five or six months, and considerable inconvenience resulting from inability to procure material. Among orders in the machinery department recently taken was a saw of 36-inch blade for shipment to France. The Pensacola Navy Yard and the Charleston Navy Yard each bought a 25-inch blade power saw, and for sizes somewhat smaller orders are numerous.

The Gates Iron Works are running their shops full time, and find business active in all departments. Among recent orders received during the past few weeks are the following: A complete reducing plant for the Granby Smelting Company, Rossland, British Columbia, making the third furnished this company, the total having a capacity of 900 tons per day; a 1,000 ton crushing plant for the Federal Lead Company, St. Francois Co., Mo., for reducing lead ores; also a large reducing plant for the American Smelting and Refining Company, Salt Lake City. The Gates Iron Works have just installed the machinery for the $500,000 plant of the St. Louis Smelting & Refining Company in St. Francois Co., Mo., the machinery consisting of sixty car loads.

Quotations.

NEW YORK, Monday, April 15.

Pennsylvania Foundry Pig Irons, Jersey City Delivery, good brands:

No. 1 X	$16 15 @ $16 50
No. 2 X	15 40 @ 16 00
No. 2 plain	14 65 @ 15 25
Gray forge	14 40 @ 14 75

Alabama Pig, New York Delivery:

No. 1 foundry, or soft	16 00
No. 2 foundry, or soft	15 50
No. 3 foundry	15 00
Foundry forge, or No. 4	14 75

Bar Iron—Base sizes—Refined brands, mill prices on dock 1.55 @ 1.65c.; from store, 1.80 @ 1.90c.

Tool Steel—Base sizes—Good standard quality, 7c.; extra grades, 10c. and upward.

Machinery Steel—Base sizes—From store, 1.90 @ 2.00c.

Cold Rolled Steel Shafting—Base sizes—From store, 2½ @ 2¾c.

Copper—Lake Superior ingot, 17c.; electrolytic and casting, 16⅝c.

Pig Tin—26 @ 26¼c., for 5 and 10-ton lots, f. o. b.

Lead—For wholesale lots, 4⅜c., with .02½c. extra for carloads.

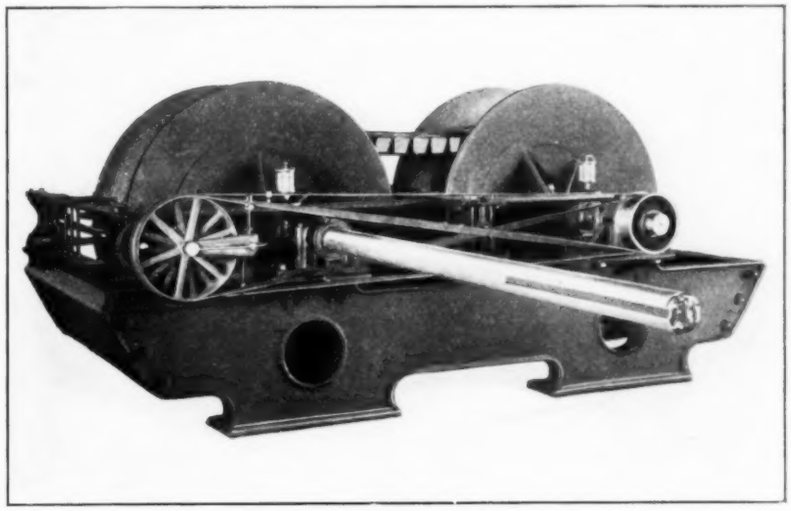
Spelter—3.95c., New York.

Antimony—Cookson's, 10¼ @ 10½c.; Hallett's, 8¾c.; U. S., 9 @ 9⅛c.; Hungarian, Italian and Japanese, 8.62½ @ 8.65c.

Lard Oil—Prime City in jobbing lots, 71 @ 72c.

A Large Variable Speed Device.

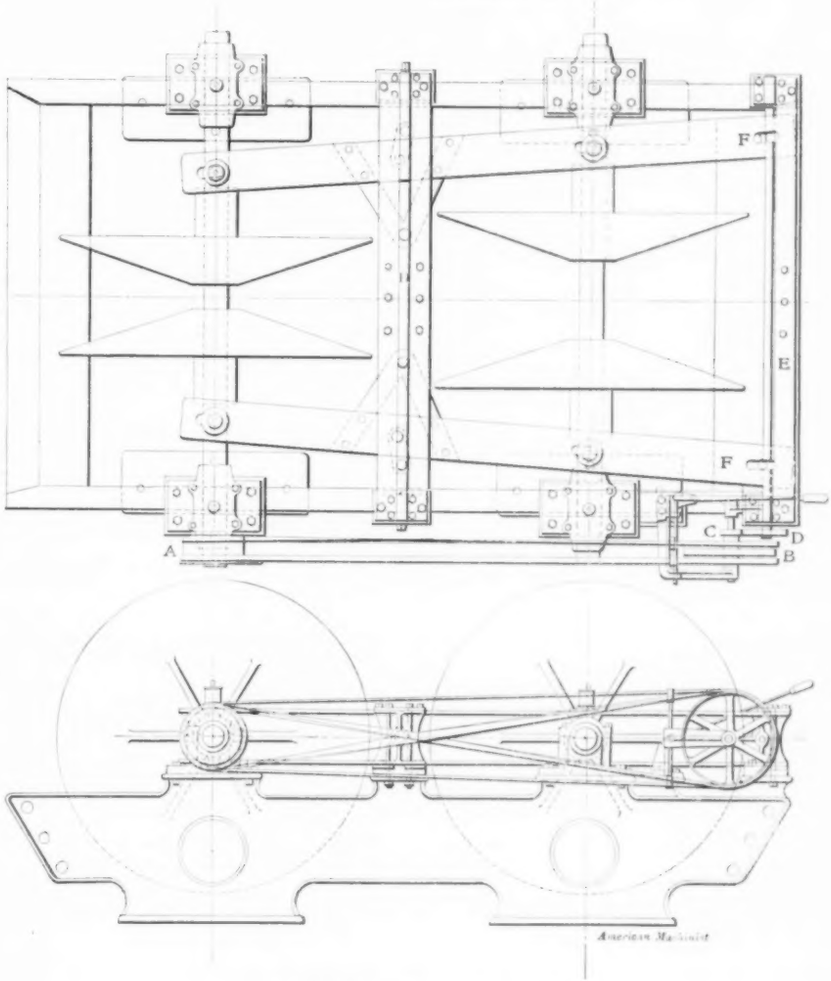
Our readers are perhaps sufficiently familiar with the Reeves variable speed countershaft, which has been fully illustrated and described in our columns. This device has found a wide field for its employment wherever power is to be transmitted from a driving to a driven shaft and where it is at the same time desirable or in fact necessary to minutely control the speed, or to change it at will through a considerable range of variation. The application of it has extended to various industries where it is perhaps more valuable than in the machine shop or the wood-working establishment. It is found of the highest value, for instance, in paper mills, also in glass factories for operating the grinding tables, and in the metal-working factories generally.



A LARGE VARIABLE SPEED DRIVE.

Perhaps the greatest surprise in the development of this invention has been in the large drives that have been called for. The half-tone, Fig. 1, shows a drive which transmits 125 horse-power with a speed of 175 rotations per minute for the constant speed shaft, and a still larger drive than this is made. The transmission here shown was built to transmit the power operating the large drying rolls of paper mills. Some of the principal dimensions of it are as follows: Diameter of shaft, 4½ inches; diameter of disks, 5 feet; length over all, 12 feet 8 inches; width, 8 feet; center to center of shafts, 6 feet; center of shaft to floor, 3 feet; approximate weight, 10,000 pounds.

In the smaller countershafts, where the power transmitted is only a horse-power or so, it is a simple matter to change the speed by the operation of a hand lever, the disks upon the two shafts being so connected that one pair moves outward as the other moves inward, and *vice versa*. On a drive as large as here shown, however, power must be employed for the changes required, and a simple mechanism is provided for the purpose. The end of the farther shaft in the half-tone, or the left-hand shaft in Fig. 2, carries a small wide-faced pulley *A*, and from this are led an open and a cross-belt to the light pulleys *B* at the other end of the machine. There are three of these pulleys, two loose and a tight one between them, as in the familiar planer drive, and a hand lever is provided for moving the shippers in either direction. On the pulley shaft is a pinion *C* meshing into gear *D* on the right and left cross-screw *E*, which carries nuts which engage the levers *F*. The levers and the driving disks are thus moved in either direction at the will of the operator who manipulates the belt shipper. It will be noticed that in Fig. 2 the relative positions of the parts are reversed from those in Fig. 1, but otherwise they are practically alike. The central cross-screw *H*, most clearly indicated in the plan Fig. 2, is for adjusting the disks to give the correct tension to the friction link belt, this thus being done independently of the speed changing mechanism. This drive is made by the Reeves Pulley Company, Columbus, Indiana.



A LARGE VARIABLE SPEED DRIVE.

Turret Lathe for Extra Heavy Work.

One line of progress with the turret lathe has been in the adapting of it to larger and heavier work, and with this has gone a simplification of the tools used in order to reduce the amount of tool-making necessary to arrange the machine for different jobs, and so adapt it to the production of smaller lots.

We show herewith a machine which is the latest development on these lines. It attacks work of a size and weight which are quite unexampled in previous turret lathe work, and in its adaptation to such work features are introduced which are of a high degree of interest. The turret is of a size and weight which make necessary the introduction of other than manual power for its traverse and rotation. To attempt to move such heavy parts by the usual pilot wheel, or any equivalent of it, would involve either very slow movements or very laborious work on the part of the operator. The turret is therefore operated by belt power—the operator manipulating certain levers which engage the power devices—and the lathe is hence called a semi-automatic machine. A second feature of the lathe—or rather of the practice in its use—is the reliance to a greater degree than heretofore on broad scraping tools which are forced directly against the work and finish their surfaces without the usual feed across the surfaces. This, in turn, requires a large increase of belt power and some other interesting features in tool practice. Regarding the belt power provided, we should say that the appearance of the tool is, in this respect, deceptive. The impression given by the illustrations is that the machine is lightly and not heavily belted—the impression arising from the size of the cone pulley and its location. While placed in the usual position on the live spindle, it does not, in fact, drive that spindle directly. The back gears are used even in the highest speeds—an arrangement which involves a speed in the cone pulley which gives a great excess of power over what is necessary in ordinary lathes. The highest back-gear ratio in the lathe shown is 83.

Fig. 1 shows the 24-inch size, and incidentally some of the tools and tool-holders used with it. The main turret will be seen to be of the hollow type, with suitable holes and faces in its sides for attaching the various tool-holders. Two of these faces are larger than the others and have four holes, three of which are grouped around the fourth. The central hole is intended to carry a "supporting arbor," while the other three carry tools. These two large sides are also arranged for attaching tool-holders to the top of the turret, making it possible to present four tools at a time. The total number of tools which the turret may carry on all faces is thus eleven. In addition to this, a smaller supplementary turret, carrying four additional tools, is mounted upon one side of the main turret. The rotation of this supplementary turret is by hand, but its cross-feed traverse is by power.

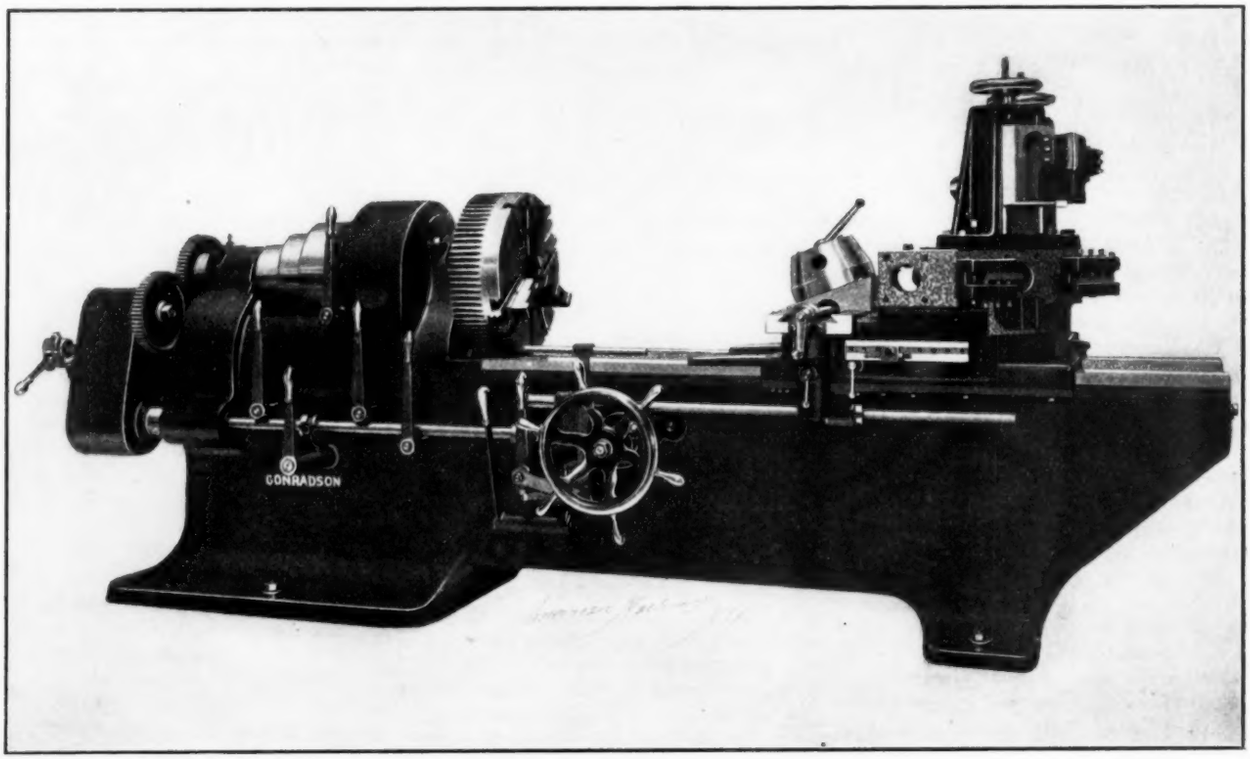


FIG. 1. TURRET LATHE FOR EXTRA HEAVY WORK.

The various combinations of back gears are obtained by manipulating the levers shown in front of the headstock; all of which, except the one mounted on the lowest shaft, are for this purpose. Fig. 2 is a section of the headstock and shows the arrangement of back gears and clutch levers. Keyed to the cone pulley are two gears *a* and *b*, of different size, and through them all combinations of back gears are driven. Gear *a* meshes with *c* and *b* with *d*, both *c* and *d* running freely on the quill *e*, which, in turn, runs freely on shaft *f*. Friction clutches *g* and *h*, with toggles and sliding cone sleeve *i*, enable either combination *a c* or *b d* to be made effective to drive the quill *e*. Cone sleeve *i* is operated by the extreme left-hand lever of Fig. 1. Keyed to quill *e* is a pinion *j*, which, with the additional gears *k*, *l*, *m*, forms a back gear combination. A claw clutch *n*, operated by the upper hand lever of Fig. 1 and feathered to the live spindle, may engage gear *k*, and thus engage it to the spindle. Similarly a claw clutch *o*, operated by the hand lever to the right and below the last named one and feathered to shaft *f*, may engage either pinion *j* or gear *m*. Pinion *p*, keyed to the end of shaft *f*, may engage with the geared face-plate as shown, or it may be withdrawn by the extreme right-hand hand lever of Fig. 1. The operating shafts of clutch *n* and pinion *p* are interlocked by the arms *q*, *r*, to avoid conflict of different sets of gears. In the position shown arm *r* cannot be moved, while if arm *q* be dropped to withdraw *p*, and *r* be then moved, *q* will be locked.

If we assume clutch *h* to be closed and clutch *o* to be moved to the left to engage with *j*, the drive will be through the parts in this order: *b*, *d*, *h*, *e*, *j*, *o*, *f*, *p*. If clutch *o* be moved to the right to engage *m*, the order will be: *b*, *d*, *h*, *e*, *j*, *k*, *l*, *m*, *o*, *f*, *p*. If *h* be opened and *q* closed, the order will be the same, but from *a* instead of *b*. If *p* be withdrawn, *n* thrown to the right and *h* closed, the order will be: *b*, *d*, *h*, *e*, *j*, *k*, *l*, *n*, to the main spindle. If *h* be opened and *g* closed, the order will

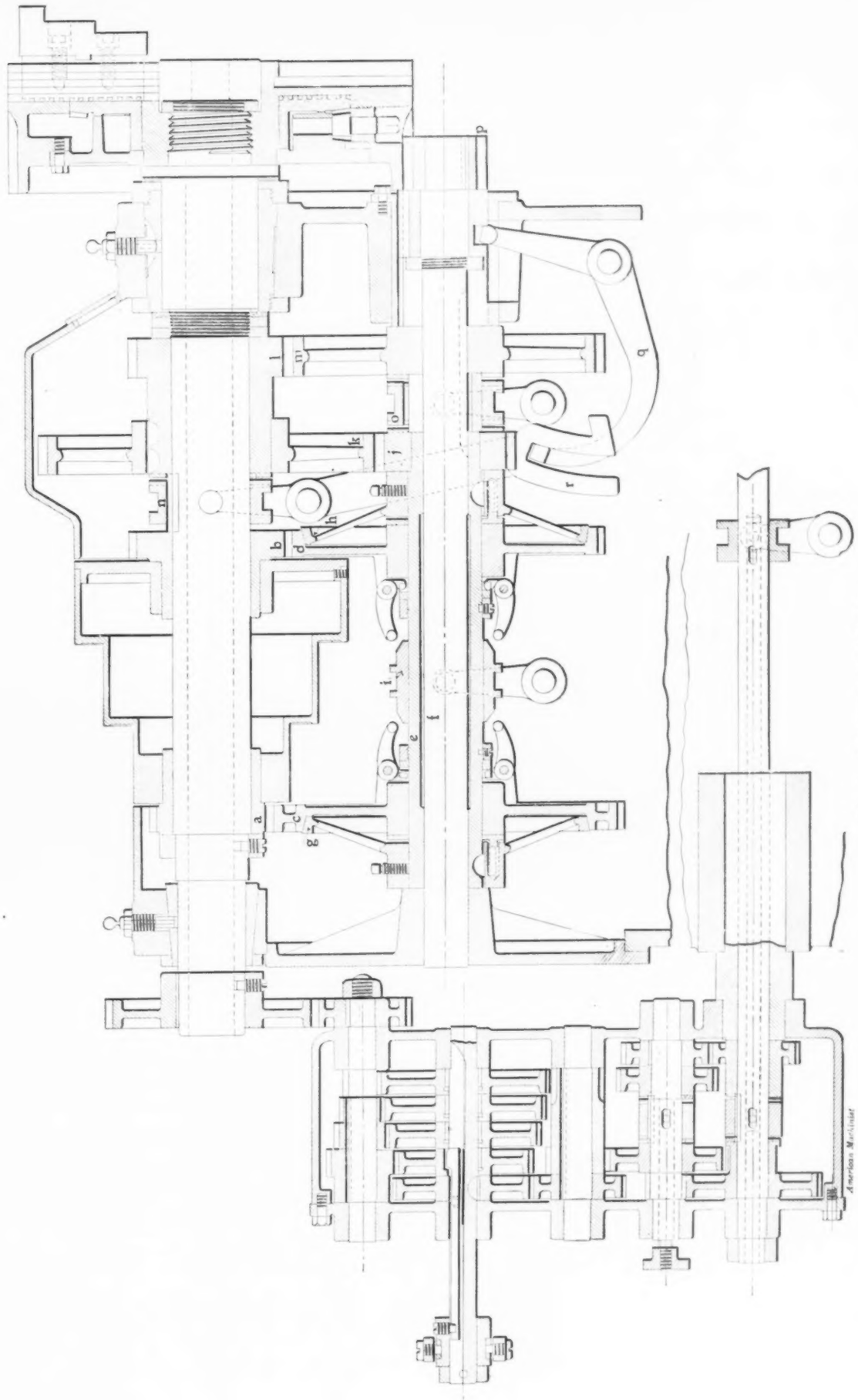


FIG. 2. SECTION OF HEADSTOCK.

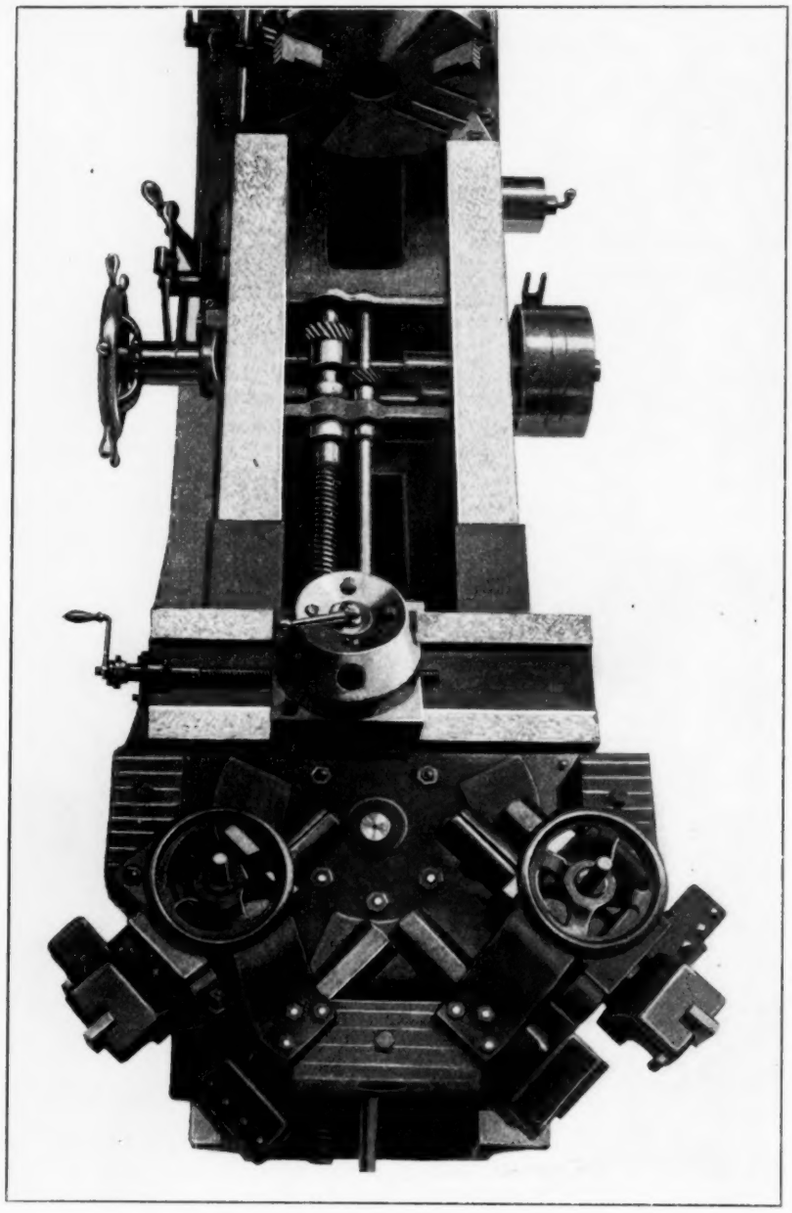


FIG. 3. OVERHEAD VIEW.

be the same, but from *a* instead of *b*. The cone pulley has three steps and the counter-shaft two speeds, the total resulting number of speeds being thus 36.

The same facility exists for changing feeds as for changing speeds. At the extreme left of Fig. 1 will be seen a gear box with a hand lever at the left of it. This gear box and its contents are also shown in Fig. 2. It is unnecessary to trace all the combinations through, but by manipulating this lever four feeds are obtained, which number is doubled by the lowest hand lever on the headstock in Fig. 1. By using change gears between the main spindle and the gear box, this result is multiplied by seven, giving fifty-six feeds in all.

The feed shaft which extends to the right from the gear box, engages with the pilot wheel by a claw clutch, and from the pilot wheel shaft the motion is carried in to a feed screw near the center of the bed, shown in Fig. 3—the connection between the pilot wheel shaft and the feed screw being by a pair of spiral gears. On the completion of a cut a stop-gage—separate for each face of the turret—engages a releasing lever, seen just back of the pilot wheel in Fig. 1, and opens the clutch. To traverse the turret back again the operator throws the belt-shipping lever at the left of the pilot wheel and thereby shifts the belts which have previously been running on the small loose pulleys, seen behind the lathe in Fig. 3. There are two loose pulleys with a tight one between them. One belt is open and the other crossed, one being used to traverse the turret to the right and the other to the left, the direction of traverse being determined by the direction of movement of the belt-shipping lever. The belts operate through the same feed screw as the feed gear, and also drive a shaft for revolving the turret, this shaft being in view in Fig. 3, alongside the screw.

The turret revolving, locking and clamping mechanism is shown in Figs. 4 and 5, in which the turret carriage is shown with the turret removed. The star wheel of Fig. 4 is secured to the turret. Below it, at the right, is a crank disk whose roller pin has just entered a slot in the star wheel to begin the turret's rotary movement—the turret having been previously unclamped and the bolt withdrawn by cams below the crank disk which operate the two bell cranks to withdraw the bolt and release the clamp. In Fig. 5, which shows more clearly the bell cranks and cams, the star wheel is removed and the movement has been completed. The rotating mechanism is thrown into gear by the small hand lever seen in front in these views, but it goes out of action automatically on the completion of the movement.

The locking bolt will be seen to be of a new pattern. The V-notch in the end insures a positive lock without shake, so far as the engagement with the turret is concerned. At the rear the bolt is divided by a wedge incline. The outward thrust on the bolt being upon the inner piece, the action, after the bolt is home, is to wedge it positively without shake in the slot in the turret carriage. The former action is, of course, common in such locking bolts, but the second one is, we believe, new.

The clamping of the turret to its carriage is by the two segmental pieces at the right and left of the pictures. The lower ends of these pieces are thrust apart by the connecting toggle, which is, in turn, actuated by the lower bell crank. The action of these segments in clamping the turret is shown in Fig. 6, in which *a* is the turret, *b* the turret carriage and *c* the segment. At *d*, *e*, *f*, *g* are the cams which operate the bell cranks. At *h* is the star wheel, at *i* the roller crank pin and at *j* a gear for turning the cams and cranks; this gear being in turn driven by the shaft seen alongside the feed screw in Fig. 3.

Fig. 7 is an interior view of the maker's shop, and shows the lathes in progress.

While our illustrations are all taken from the 24-inch size, the lathe is, in fact, made of 20, 24, 32 and 40 inches swing. The machine is the product of the American Turret Lathe Company, of Wilmington, Del.

In our next issue we expect to show some features of the tool practice employed with these lathes.

Echoes from the Oil Country.

LITTLE WORRIES—RECUTTING ADJUSTABLE DIES.

I suppose some of my wise friends would not be disturbed in any degree by the little matters that cause me to lose my rest and peace of mind. When Jonah came in and wanted a thing "just like that," and handed me what he called a

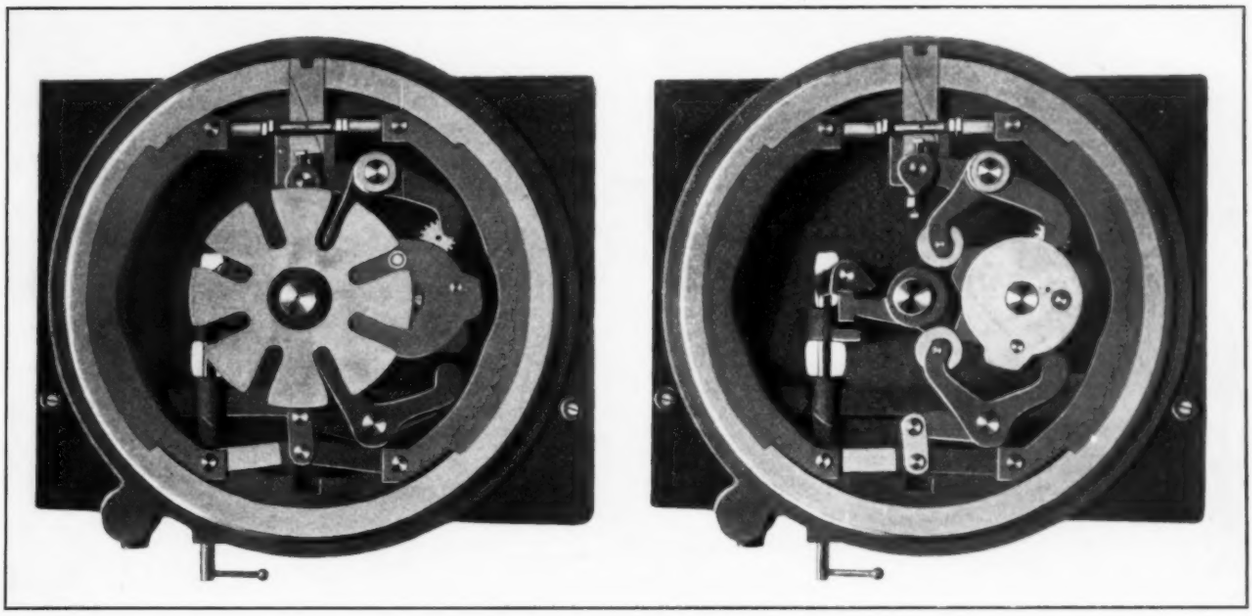


FIG. 4. TURRET OPERATING MECHANISM. FIG. 5.

pattern, with the statement that he wanted two castings from it. I took his word for it that he did, and when he asked the price, I told him 3 cents a pound. Well, I made him the pieces and got paid for them. After a time he came back with one that had broken and demanded that I make him another, free of charge, as that one was spongy. So it was; "just where he had made it heaviest to stand the strain, it had shrunk open and broken." This was not a shrink crack, but just a soft spot inside. Now, I did not furnish the design or pattern, or know what was to be done with the pieces, and I hardly felt as though I should be called upon to do more than supply an ordinary iron casting. What do you think?

When Davis gave me a sketch of what he wanted and asked me the price, I told him it would be a little high, as a pattern would have to be made. He said he expected that, but wanted an estimate. I gave him one and got the job. It seemed to have worked very well, as he got some more castings; paid 3 cents for this lot; wanted some more, but thought he could get them cheaper elsewhere, and sent over an order for *his* pattern. I didn't know he had one, but he thinks he has, and will get it, too. Should he have it or not?

When I put a boy on that pump job I thought he could do it well enough, but I found I had to put a man on to go over some of the work again and do it better. Unfortunately, the owner of the pump was standing around waiting for it, and when it was done and his bill was ready, he objected to paying for the work of both boy and man. He said if the boy had been any good, the man wasn't needed on the job, and shouldn't be paid for; and if the boy wasn't any good, he shouldn't have been put on the job, and so he shouldn't be charged for if the man was. All the work was done by the hour. I told him I had thrown in the bossing, which seemed to daze him, so he paid the bill; but, really now, what would have been fair in the matter?

Martin came in and wanted a machine

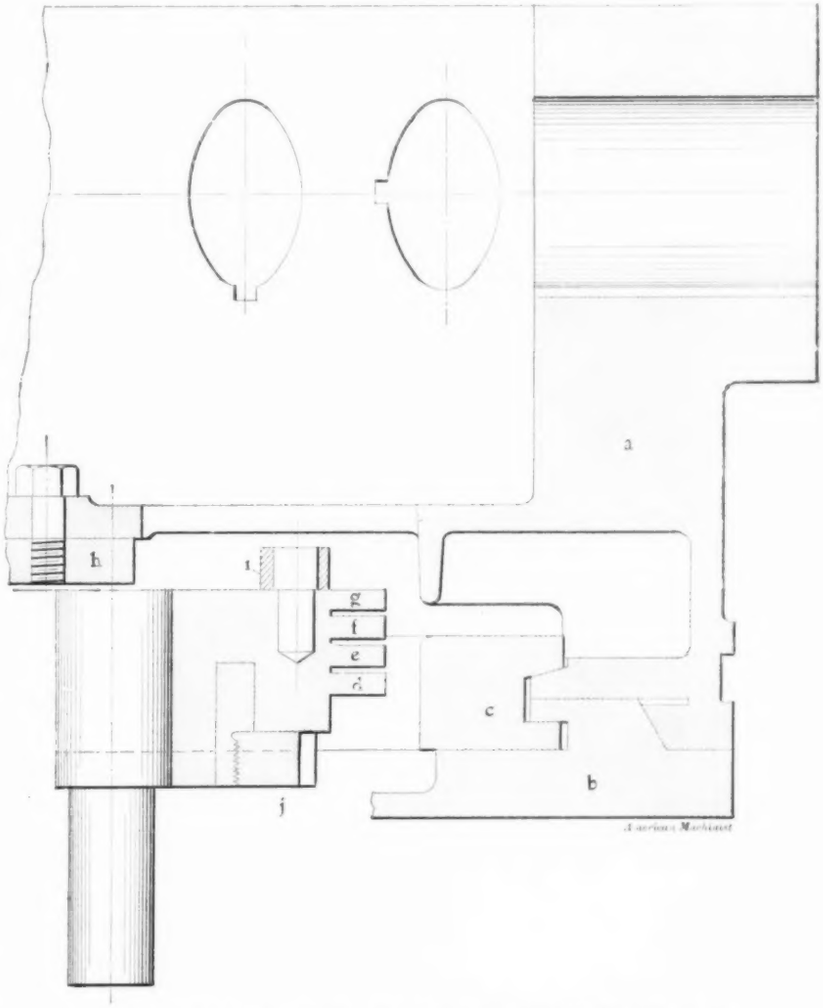


FIG. 6. SECTION OF TURRET AND CARRIAGE SHOWING TURRET CLAMP.

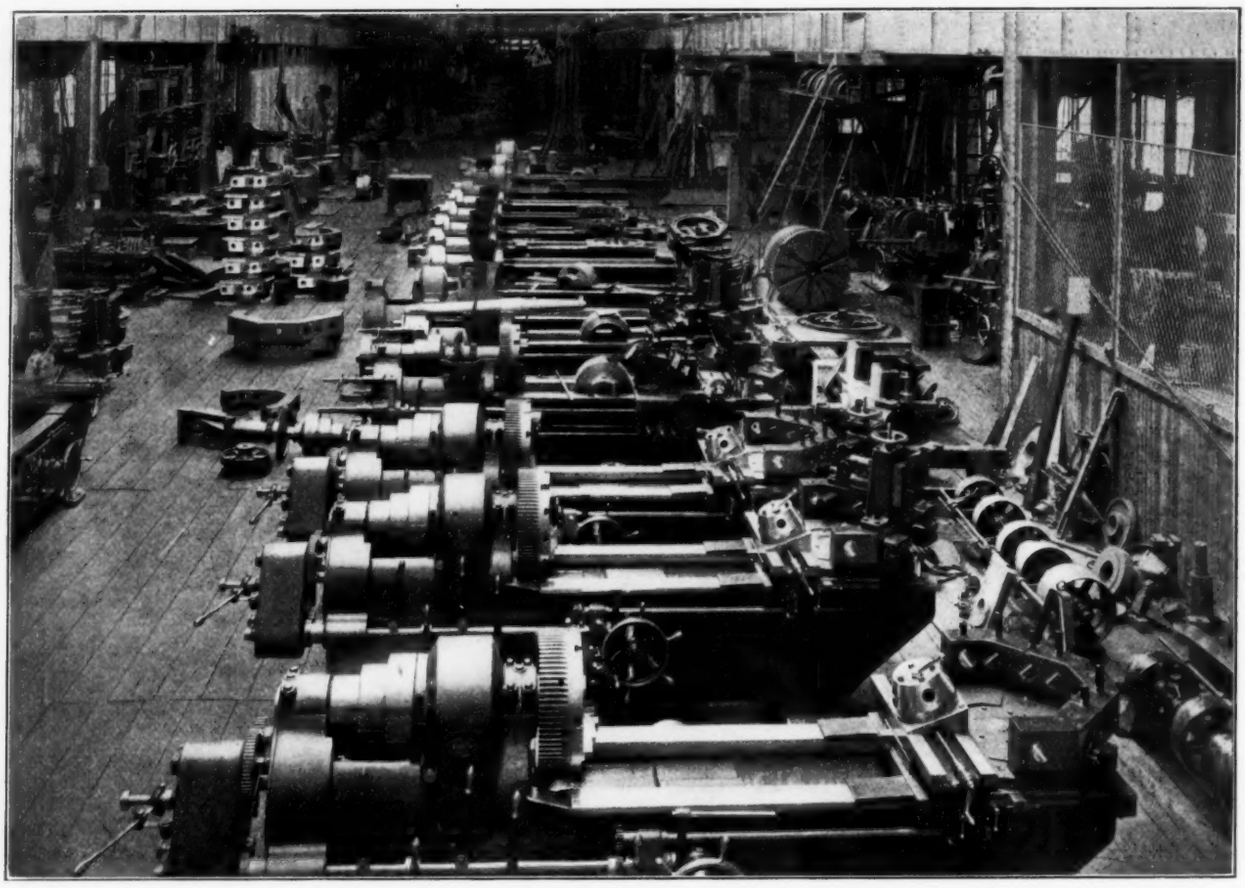


FIG. 7. INTERIOR VIEW OF AMERICAN TURRET LATHE COMPANY'S WORKS.

built; didn't have any machine or drawings or model to show; wanted it something like another one he had, and also something different. He wasn't just sure where the like left off and the difference began, but could tell as the thing was being built. He wanted to know what it would cost to build it. Of course as he coul'dn't guess just what he wanted, I couldn't guess what I could build it for, but told him I would build it by the hour. He then wanted to know at what rate. I told him 50 cents per hour. He laughed and said I was away up, as a neighboring shop had offered to do it that way for 40 cents per hour. Not to be outdone in friendliness, I gave him a price of 30 cents per hour. That seemed to please him, until he asked me how I could have had the gall to ask 50cents at first. Iexplained that I would keep my 50-cent man for other work and give him a cheaper man for his job. This made him question the ability of the man, but, as I stood back of that, he seemed satisfied until I casually remarked that it might take a little longer to get the job done, and the finish would not likely be quite as good. This led him into a request for a comparative cost of having the work done by the different men. To this I replied that I could not tell just how much more the machine would cost if built by the 30-cent man, but would think about from 30 to 50 per cent., that each was good of his class, but that I supposed he wanted a cheap and good job, and so offered him the dear man. We built the machine with the dear man, and now he kicks when his work isn't done with a 50-cent man, and wants a discount on his bills to make up for the cheap man. If I give it to him I will have to cut the slow man's wages. What would you do?

A man had a casting made and wanted it planed up; it had to be planed on both sides, and both sides needed to be without wind. I had each side roughed over first, then set one side and took a light cut, turned it over and finished the most important side last, truing up the edges where a piece worked on, it being gibbed for side fit. He took the piece home and it worked first class. When he got a bill for $2.35 he seemed to think we were robbers, and told me he should not have more than half of that, or at least not more than $1.60, to pay, as that was double what he had paid before. When he mentioned having had another piece made, I began making some inquiries, and I found he had another piece that had been planed up for 80 cents in another place. It also happened that he had seen it done, and told me about it. They had finished the fine, particular, part first, because it was the hardest to hold and the casting was stronger before planing the other side, then they turned it over and roughed and finished the other side. Aside from being warped and thicker in some parts than in others, and being so tapered that the gibbed piece wouldn't work without being doctored as it was being moved, it was a pretty fair job. The piece we had made worked well in every way.

I wasted a lot of valuable time trying to explain to him that iron will crawl out of shape in some way every time it is operated on, that the crawls are not likely to be as great as the operations, and that the operations had to be so fine that the distortions were so small as to be not measurable, or at least so fine that they would not interfere with the working of the piece whatever it might be. I would like to know how I am going to get paid for my time in trying to teach him enough mechanics to get that $2.35. How would you do it?

I got my sizes for a pipe tap from the sizes given in a table of Briggs' Standard, and, for safety's sake, ran it in 2 threads farther into the castings than that called for, and it let the only piece of pipe I had of that size, which was not common with us, screw in to the center without a wrench or tongs. You can judge of my disgust when I got word that the holes were all too small, and as they were in place and couldn't be moved I would have

to tap them larger, in place, and that was a mighty poor place, too.

I went up with a helper and was given a piece of pipe as a sample that they said must go in. It was very much larger than mine, would not start in decently even. I hunted up the owner and tried to convince him that his pipe was cut too large, but L was told the castings must fit the sample furnished. After much sweating and hard work the retapping was done. As I was finishing up, a man who usually did their fitting up came on duty and I told him the trouble. He hunted up a piece of pipe with the original thread on as put on by the makers, and it screwed into the retapped holes to the end of the threads, and not a tight fit, either. I was warm enough and mean enough to wish just then that every thread would leak. As we had to do the retapping in a temperature of about 120 degrees and no circulation of air, and all because their pipe dies squeezed a thread on instead of cutting it, and it was such an awful job to cut a thread at all that they wanted the castings tapped out rather than try to cut the threads to standard size. Do you think we got paid for that job of retapping? I would like to find it on the books.

The job of recutting pipe dies is one that comes frequently to us, and while very simple it is one that I have learned to watch the men on. To show how some men learn the trade, I will relate an experience I once had. There was a bolt cutter in which the 7/8-inch dies had become worn so as to need recutting. There were only three cutters, and they were of the opening type, and set very much ahead of the center.

A master tap had been turned up about 15-16 inch in diameter and the dies recut, and, of course, they wouldn't work. If the stock was crowded in hard enough, one die would take hold and jerk the piece out between two of the dies, splitting and bending the piece, and finally breaking one of the dies. At this stage of the performance, the job was turned over to me. After looking over things a little, I had the tap annealed and turned down to 13-16 inch and made new cutters for the die and cut them. Aside from having to grind a little from the rake-off, they worked finely from the start; cut a good smooth thread with no tendency to dig in or to roll the stock out between two of them.

A neighboring concern that made boilers had a different bolt cutter that was used principally to thread staybolts, and their 7/8-inch dies played out. During my absence they came to the shop to have a tap made for recutting them. The man who had turned up the ones for ourselves turned up this one, and having had some experience turned it up 27-32 inch in diameter. He reasoned that as the staybolt was 12-thread it would not want the same clearance as our 7/8-inch ones, which were 9-thread. After the dies were recut they were worse than before. They squeezed and tore and did almost everything but cut a good thread. The man trying to run the machine said they might be good for twisting corkscrews (they would twist the 7/8-inch stock, if a long piece was used), but were the poorest things he had ever seen for cutting staybolts with, and he had cut them by hand with pretty poor dies, too.

The tap was returned to us, and the man turned it down to 13-16 and sent it back. Said he guessed he had not enough difference in size on it before. When the dies were recut the men just concluded it was their day off and struck work entirely, and we were called on again.

I went over to see the machine. The man had wanted to turn the tap down to 3/4 inch, but I stopped the job until I got back. I found that the front of the dies on this machine pointed to the center, and I went back and had a tap turned up to 15-16, and after the dies were recut with it the trouble was over.

As some of the younger men may not fully understand this, I send a sketch that will explain the matter. In the sketch I have made the clearance much greater than it should be, for the sake of making it show more clearly. Where large, solid dies with inserted cutters are used (this is the most common kind with us for sizes from 2½ inches and upward for pipe), we set the cutters in or out, as the case requires, and chase them with a thread tool, setting them to the correct size after they are filed up and tempered. Should the dies line up as No. 1 shows, a tap to recut them should be over size, or they should be set large to recut with a tool. Should they line up as 3 shows, the tap must be under size, or they should be set in to recut with a tool. No. 3 will be found the hardest to make cut just right.

I do not suppose this will interest the wise men in the large, up-to-date shops, but I give it for the benefit of the young man who may try running a small shop in a place where he has to furnish his own "think," even if he has to do queer things in making things go. W. OSBORNE

Pipe Joints for High Pressures.

BY U. PETERS.

The accompanying sketches show two pipe-joints, especially adapted for high pressures up to 7,000 pounds per square inch. They are the best and simplest joints that can be designed for such pressures, and with more or less deviations are successfully used in many hydraulic forging plants and other industrial establishments.

Fig. 1 represents a connection for bored or seamless drawn steel pipes from 3 inches up to 8 inches and larger diameters with ring-grooved male and female end for the copper gasket. The flanges and bolts are also of steel, and the accompanying table gives some dimensions for the various sizes. The table is made up from connections actually in use and approved. As the writer is informed, they stood a trial test of 7 gross tons per square inch without showing any sign of leakage, if properly connected.

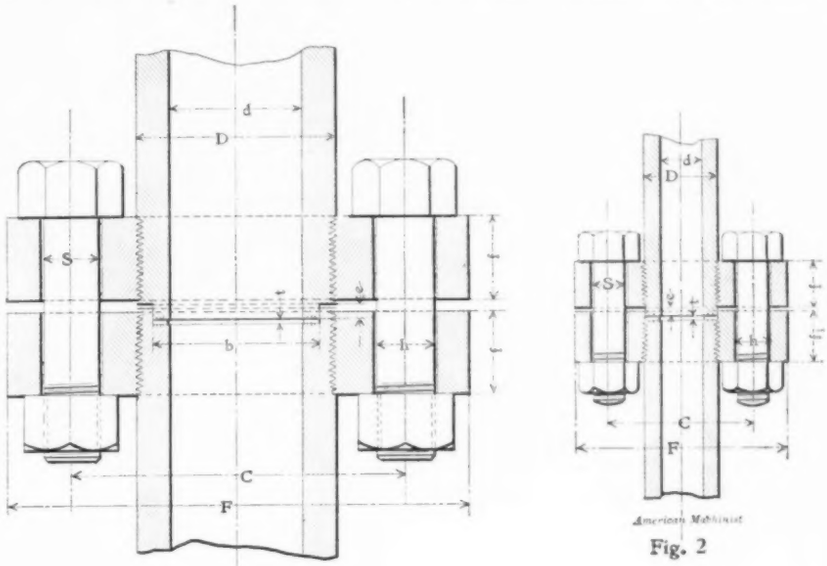


Fig. 1 Fig. 2

FIG. 1. PIPE JOINTS FOR HIGH PRESSURES.

The pipes and flanges are threaded either by the United States standard of 8 threads, or by the Whitworth's screw standard with 6 threads per inch.

For smaller pipes the connection shown in Fig. 2 is applied. Such pipes are generally called by the catalog names of extra heavy or double extra heavy steel or wrought-iron pipes. As given in the tables of the various makers, they are of different dimensions, for pressures from

Dimensions in Inches.						For 6 Bolts.			For 8 Bolts.		
d	D	b	e	t	f	F	C	S	F	C	S
3	4½	3.6	¼	⅛	1⅞	9¾	7¼	1¼	. . .	. . .	. . .
3¼	4⅞	3.9	¼	⅛	2	10⅝	7⅞	1⅜	. . .	. . .	. . .
3½	5¼	4.2	5/16	⅛	2⅛	11¾	8¾	1½	. . .	. . .	. . .
4	6	4.8	5/16	⅛	2 5/16	12¾	9½	1⅝	11¼	8¾	1¼
4½	6¾	5.4	⅜	⅛	2½	14	10½	1¾	13	10	1½
5	7½	6.0	⅜	⅛	2¾	15¾	11¾	2	14¼	11	1⅝
6	9	7.2	⅜	⅛	3	18¼	13¾	2¼	16¾	13	1⅞
7	10½	8.4	⅜	⅛	3¼	20¾	15¾	2½	18¾	14¾	2
8	12	9.6	⅜	⅛	3½	23¼	17¾	2¾	21¼	16¾	2¼

$$h = S + \tfrac{1}{16} d$$

TABLE OF DIMENSIONS OF PIPE JOINTS.

500 to 7,000 pounds per square inch. The flanges are usually of forged or cast steel and of different shapes, corresponding to the number of bolts from oval-like, triangular and square to round, and it would take much valuable space to tabulate all these dimensions. More difficult to determine than the size of the pipes for heavy pressure is the size of the flange bolts. A formula is therefore here given:

$$\frac{\text{4,000 to 5,000 } (D^2 - d^2)}{\text{Number of bolts.}} = \text{Safe tensile strength of bolt.}$$

The factor 5,000 is used in figuring the strength of bolts for higher pressures. The length of thread can be made for:

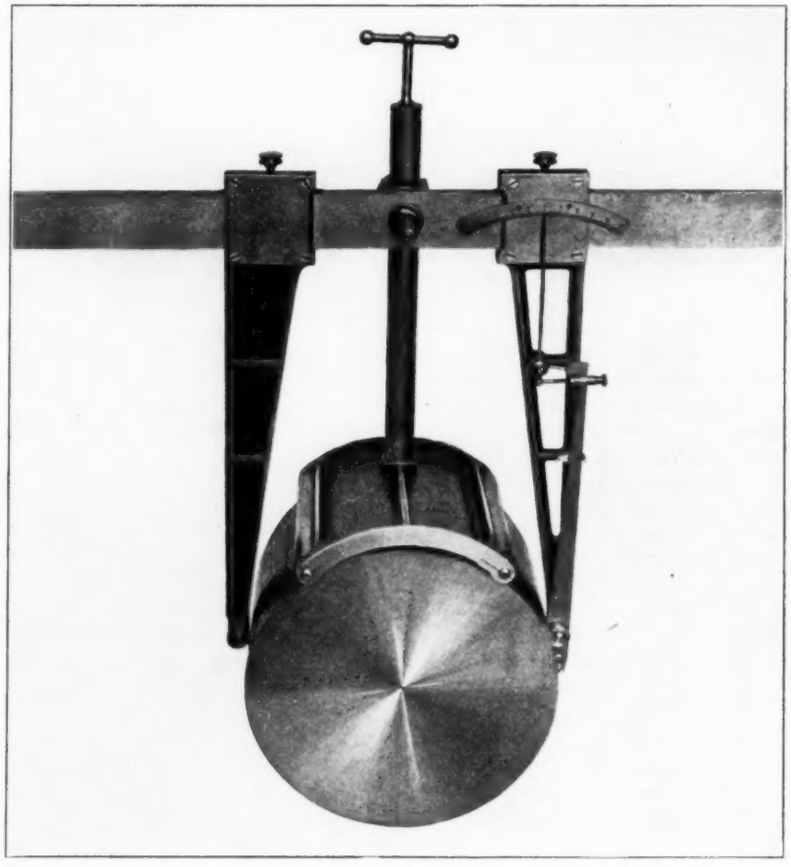
Cast-steel and wrought-iron flanges, $f = 2.25\ (D - d)$;

Cast iron flanges, $f = 2.50\ (D - d)$.

$f_1 = f + \frac{3}{16}$ and $e = \frac{3}{16}$ to ¼ inch. The thickness of the copper gasket is usually not over ⅛ inch.

A Roll Gage.

The accompanying engraving shows a gaging implement which has been devised especially for gaging rolls such as are used in the cold rolling of sheet metal, where, as our readers know, very great accuracy is often required. The gage consists essentially of a curved plate, which rests on top of the roll to be gaged. Rising from the center of this plate is a cylindrical standard having graduations upon it and attached to a piece sliding upon this standard there is a swinging bar which is graduated and carries two measuring jaws. The one at the left is plain and solid, while the one at the right is made of an open framework form and with a contact piece attached to the short arm of a multiplying lever which is connected to the shorter arm of a second multiplying lever, which indicates variations of diameter on the curved scale shown above, the graduations of this scale being to half-thousandths. In using the gage the horizontal beam is set on the standard to the nominal diameter of the roll as indicated by the graduations on the standard. The left-hand jaw is set also to the graduation corresponding to the nominal diameter of the roll and the right-hand jaw, so that at the beginning of measurement the pointer will indicate zero. Then when the gage is moved endwise upon the roll any variation of diameter is shown upon the graduated scale. The horizontal arm is free to swing in a vertical plane during this process. Usually the lower roll is not truly cylindrical, but is largest in the middle, there being a straight or cylindrical section in the middle with slightly tapering sections at each end, the result being when pressure is put upon the rolls the upper line of the lower roll is practically straight and the metal is rolled to practically uniform thickness. This gage is especially adapted for indicating when the designed taper has been secured; the grinder's experience telling him what the proper taper is. The object of making the left-hand jaw solid is that it may be the heavier, so that by placing the finger upon the horizontal bar at the right and swinging this bar slightly the contact points are made to pass over the largest diameter of the roll. All the contact pieces are made cylindrical, but do not turn freely. They can, however, be turned by loosening the screws so as to bring fresh contact surfaces in use when the instrument has become worn. It is manufactured by H. C. Cook, Ansonia, Conn.



GAGE FOR ROLLS.

Boring Elliptical Cylinders.

BY ALBERT E. GUY.

The process imagined by Professor C. W. MacCord for boring elliptical cylinders, which was exposed in the "American Machinist" No. 8, is at once interesting and theoretically correct. In practice it may not meet with the complete success it deserves, because of the several motions which must be imparted to the work and to the tool—for it is well known that in boring an ordinary cylinder the result is the best when both the boring bar and the work are the most rigidly held; but notwithstanding this lack of rigidity this process has the great advantage over other methods in use, that by it the boring of a long cylinder is feasible.

In the course of a discussion relative to the probable method employed in boring the elliptical cylinder of a pneumatic tool now on the market, the writer suggested the following, which was eventually tried

and found satisfactory for short cylinders only. It is based on the fact that the angular projection of a circumference is an ellipse.

If a great number of very thin disks of any convenient material—say of steel and each 1-1000 inch thick—be piled up so that all the centers be on straight line perpendicular to the face of the disks, as in Fig. 1, the end view or vertical projection will be a circle and the ensemble of the disks will form a cylinder. By inclining the line of centers, as shown in Fig. 2, the stack of disks becomes an inclined cylinder, and the end view along the line of centers is no longer a circle, but an ellipse, while the vertical projection of the top disk is still a circle. The hight of the stack is of course the same, since there is in it the same number of plates as before. If we imagine the disks to be infinitely thin, we may conceive that the surface of the inclined cylinder may be perfectly smooth, and consequently we have here what is—as generally understood—an elliptical cylinder, but whose correct definition is: ellipsoid of translation. Now, if instead of disks, we had employed thin rings in our experiment, we would have produced a hollow elliptic cylinder.

In Fig. 3, $B\,D$ is a boring bar swung on centers on a lathe; $A\,C$ is an arm holding at its end C a boring tool. When the bar is rotated the point C describes a circle. A casting M, which is to be bored elliptically, is secured rigidly to a carriage capable of being moved in the direction of $E\,F$, which is the longitudinal axis of M and passes through A. Consequently, if the boring bar is rotated on its centers and the work fed gradually, in the ordinary way, along axis $E\,F$, the cutting tool, at each revolution, describes a circle; but, because of the inclination of axis $E\,F$, when the tool occupies the position shown in dotted lines, the boring will be achieved and the end view of the casting will show a perfect elliptical bore, for the combined motions of the tool and work will have produced nothing else but an inclined cylinder $C\,C_1\,C_2\,C_3$ similar to that shown in Fig. 2. Of this cylinder only the portion $C\,C_4\,C_2\,C_3$ is utilized by the casting M.

In his article Professor MacCord states that, with his system, "the rate of cutting is of course not uniform, but neither is it in the use of the ordinary elliptical chuck; nor is it possible to make it so, except by making the actual rotation of the lathe or of the boring engine variable." We see that with the present method the rate of cutting is perfectly uniform, because the tool describes a circumference and removes a uniform thickness of metal at a uniform rate of speed.

As shown in Fig. 3, the length of the cylinder that can be bored is quite limited when the ratio of the diameters of the ellipse is considerable, for, as the tool finishes the last cut at C_2, the edge C comes in contact with the boring bar. This length may be determined as follows: Let line $C_2\,C_3 = D =$ major axis of the ellipse, and $C_2\,C_4 = d =$ minor axis; $C\,C_4 = h =$ the length of the bore. Angle $C_3\,C_2\,C_4 = a = O\,C\,C_4$ because the sides of one angle are perpendicular respectively to those of the other. b being the diameter of the boring bar, we have:

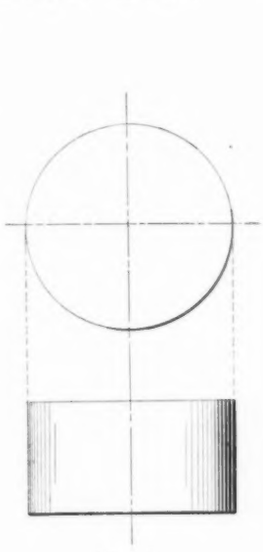


Fig. 1

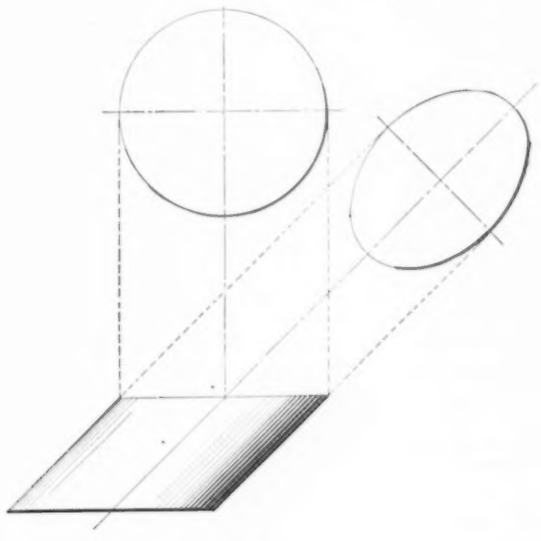


Fig. 2

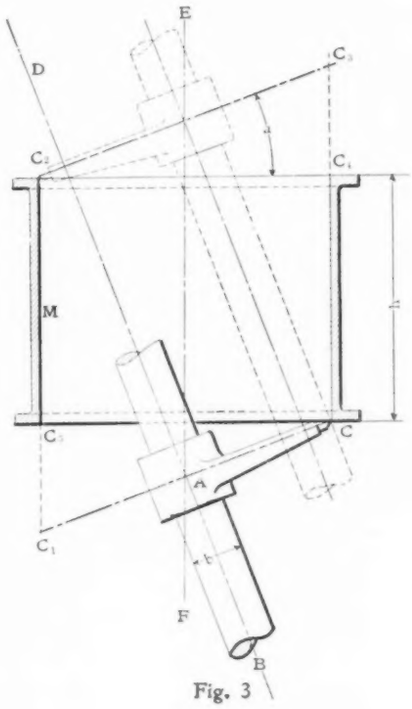


Fig. 3

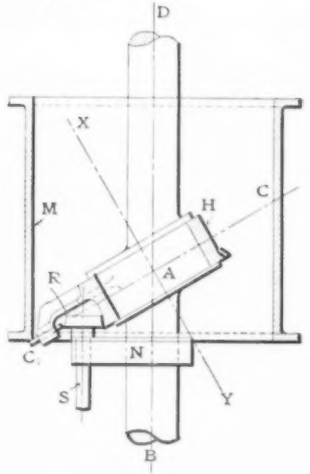


Fig. 4

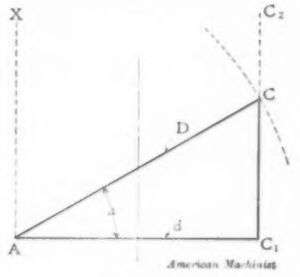


Fig. 5

BORING ELLIPTICAL CYLINDERS.

$$D \sin. a = C_3\,C_4.$$

$$(h + C_2\,C_4) \sin. a = \frac{D}{2} - \frac{b}{2} \qquad (1)$$

or $$(h + D \sin. a) \sin. a = \frac{D - b}{2} \qquad (2)$$

whence $$h = \frac{D - b}{2 \sin. a} - D \sin. a.$$

This trigonometric formula can be changed into a geometrical one by expressing sin. a in function of the two axes D and d. Thus:

$$(D \sin. a)^2 + d^2 = D^2$$

$$D \sin. a = \sqrt{D^2 - d^2}$$

$$\text{Sin. } a = \frac{\sqrt{D^2 - d^2}}{D}$$

Introducing these two expressions into equation (2), we have:

$$h = \frac{D(D - b)}{2\sqrt{D^2 - d^2}} - \sqrt{D^2 - d^2} \quad ; \quad (3)$$

and by simplifying:

$$h = \frac{2\,d^2 - D^2 - D\,b}{2\sqrt{D^2 - d^2}}$$

For example, if $D = 30''$, $d = 28''$, $b = 5''$,

$$h = \frac{2 \times 28 \times 28 - 30 \times 30 - 30 \times 5}{2\sqrt{30 \times 30 - 28 \times 28}} =$$

$24.048''$;

and if $D = 30''$, $d = 24''$, $b = 5''$,

$$h = \frac{2 \times 24 \times 24 - 30 \times 30 - 30 \times 5}{2\sqrt{30 \times 30 - 24 \times 24}} =$$

$2.833''$.

These two examples suffice to show the narrow range of the system as it is. However, a very simple modification of it widens its limit and permits of boring very long cylinders with all the accuracy desirable.

This modification is exposed diagrammatically in Fig. 4, in which $B\,D$ represents an arbor swung on the centers of a lathe. M is a cylinder fastened upon the sliding carriage, its longitudinal axis coinciding with that of the arbor. At A on the arbor, and forming part thereof, or secured to it, is a flanged cylinder whose longitudinal axis $X\,Y$ forms a given angle $X\,A\,D$ with the arbor. This cylinder is in reality a trunnion about which the sleeve H—carrying one or more boring tools secured to it in the usual way—rotates in such a manner that the point of the tool C_1 describes a circumference about center A and in the plane $C\,A\,C_1$. The sleeve H has on its circumference cut teeth of sufficient width to mesh with those of a bevel pinion R mounted on a shaft S working in a bearing N which is made fast to the arbor. Now if the arbor is rigidly held in place and the shaft S rotated, the motion will be imparted to the sleeve and the tools will cut into the metal of the cylinder M. Then if this latter is moved axially by the feed of the carriage, in consequence of these combined motions the cylinder will be bored elliptically, and the rate of cutting will be uniform, just as in the system previously described.

The cylinder may also be held in place while the arbor is moved longitudinally, and the disposition of the sleeve and of the driving gear may be changed, without altering the result if the fundamental principle of the system is adhered to. In fact, this system is capable of a great number of modifications.

The angle at which the plane $C\,A\,C_1$ must be set for a given ellipse can easily be determined graphically or figured. Let the horizontal $A\,C_1 = d =$ the small axis of the ellipse, Fig. 5, and at C_1 erect perpendicular $C_1\,C_2$. From point A, with a radius $= D =$ the large axis of the ellipse, describe an arc of circle cutting the perpendicular at C; join $A\,C$ and angle $C\,A\,C_1$ equals angle $D\,A\,X$ in Fig. 4, where angle $D\,A\,C$ equals $C\,A\,X$ in Fig. 5, $A\,X$ being perpendicular to $A\,C_1$. Otherwise we have at once: cos. $a = \frac{d}{D}$, and we find the value of angle a from tables of trigonometrical functions.

The Paris Exposition—XX.

IMPROVED LANDIS GRINDERS.

The main features of the Landis grinders are familiar to our readers, but at Paris machines of their make were shown that had recent improvements worthy of note. At Fig. 178 one of these machines is shown. It is called by the makers the No. 1 Universal, and on the front will be noticed a rather peculiar arrangement of

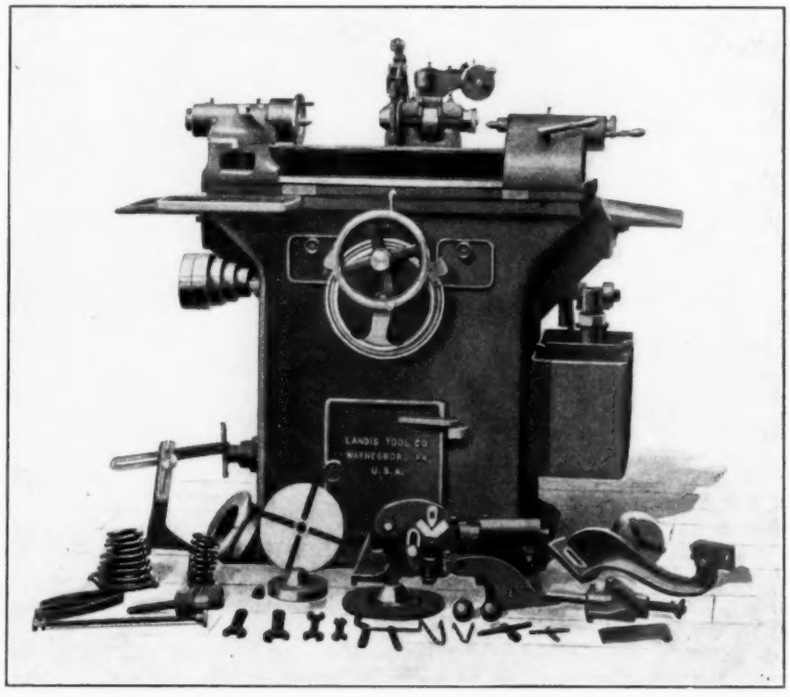


FIG. 178. UNIVERSAL GRINDER SHOWN AT PARIS BY THE LANDIS TOOL CO.

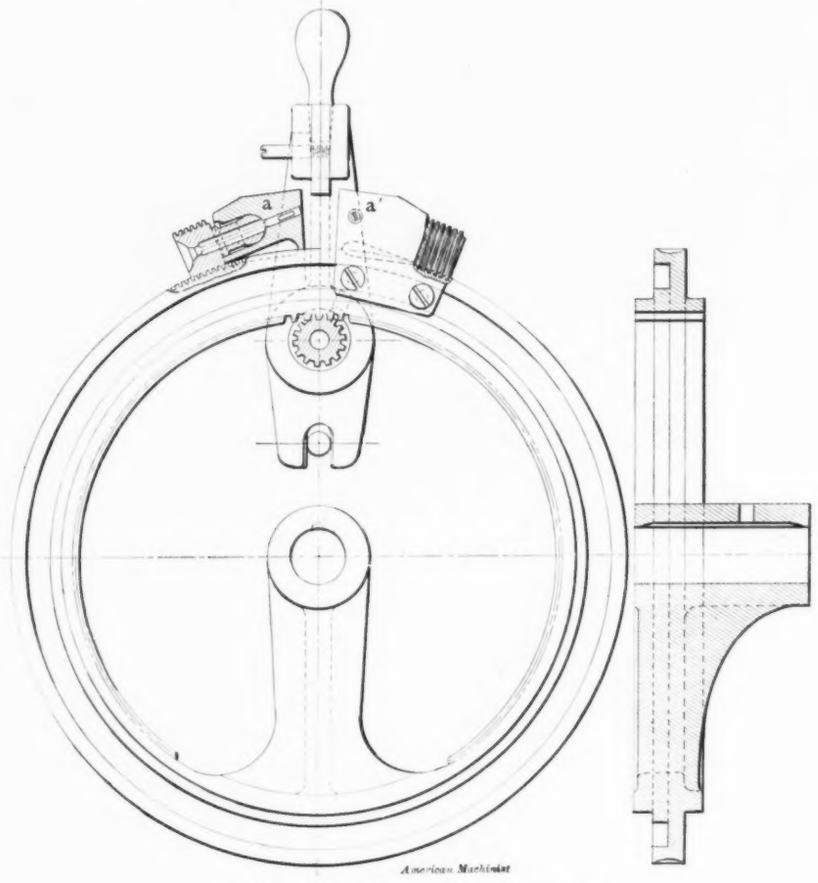


FIG. 179. DOG WHEEL FOR LANDIS GRINDER.

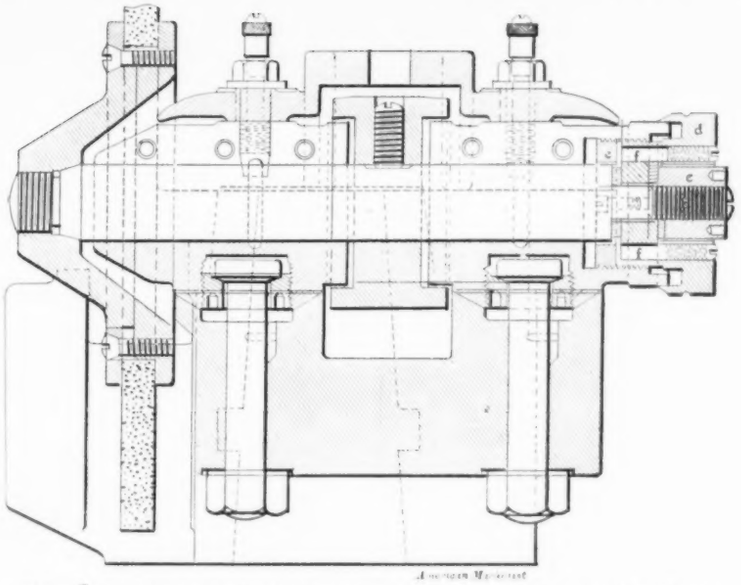


FIG. 180. SECTION THROUGH SPINDLE AND BEARINGS OF LANDIS GRINDER.

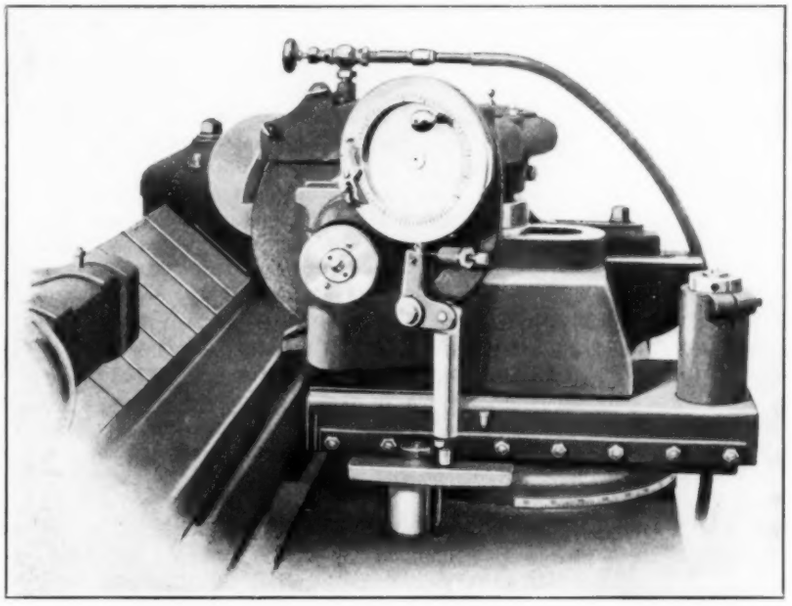


FIG. 181. AUTOMATIC CROSS-FEED ATTACHMENT ON UNIVERSAL GRINDERS.

wheels, the axis of one of them passing through the other wheel near its periphery. The upper one of the two wheels is the hand-wheel by which the platen of the machine is moved, and on the same shaft with it is a pinion which engages with internal teeth cut inside the rim of the other wheel, as shown in Fig. 179; this last mentioned wheel having only one arm, so that it can make nearly a complete turn without interference. This single-armed internal wheel is called a dog-wheel, and is simply a moving feed reversing bar, made in circular form instead of straight as usual. On the periphery of this wheel worm-teeth are cut, and, adapted to slide upon the rim, are two dogs *a a'*. These dogs are held in any desired position upon the rim of the wheel by the worms shown, which worms, as will be seen by the section of the dog *a*, are extended within the dogs, and have spherical ends which are seated within the dogs. A pin passes through the center of the worm and through the dog, so as to hold the former in place and allow it to turn, and this pin is flatted, as shown, so that it is also a spring, allowing the worm to be lifted out of engagement with the worm-teeth when desired, but tending always to return it to engagement. These dogs reverse the motion of the platen by striking the tappet shown above them in Fig. 179, and when it is desired to move them a considerable distance upon the wheel, the worms are lifted out of engagement, when the dogs slide freely upon the rim. For fine adjustment the worm is turned, and it will be noticed that with this form of adjustment there is no limit to its movement; it is always ready to be moved in either direction. The piece that the dogs strike against when the motion of the table is to be reversed can be swung upward out of the way, so that the reversing dogs can be run past it when it is desired to do so for inspection or measurement of the work without disturbing their adjustment.

This fine adjustment of the automatic stops is not enough to cover all the requirements, however, and there is provided, therefore, a micrometer endwise adjustment for the wheel spindle within its bearings, and the mechanism for this is shown in Fig. 180, which is a longitudinal section through the spindle and its boxes. The right-hand end of the spindle is threaded as shown at *b*, and fitted to this thread is a collar *c*, having holes for a spanner wrench by which it can be adjusted on the spindle and a screw in the end for locking it in position when adjusted. At the other end of this collar is a flat bronze washer, and between this washer and a similar one seen farther to the left is an inward projecting portion or thick flange of the piece *d*, which does not turn with the spindle, but is the member which holds it from endwise movement, and at the same time affords the means by which it is moved endwise when it is desired to do so by a small amount. As will be seen, the piece *d* is threaded into the projecting end of the box by a square thread; it is knurled and graduated on its periphery, so that when rotated by hand, the spindle is moved endwise. It is of course very important that there should be no slack or lost motion in this part of the device, because when it is desired to grind, say, just 0.001 inch from a shoulder, it is important that when the piece *d* is turned one graduation, the wheel shall move precisely the required distance. This is accomplished by means of the ring *e*, which is separate from the piece *d*; but, like it, is threaded into the end of the box, and is made to turn with the piece *d* by means of screws passing through one and into the other, while in the places *f* and *f'* are springs which tend to separate the two pieces and thus take up all lost motion in the threads.

There is also an automatic device for taking up all slack or lost motion in the movement of the cross-slide, so that the movement of the wheel toward or from the work will always be in strict accordance with the movement of the cross-feed hand-wheel, as indicated by the graduations. This device is shown in place on the machine at Fig. 181, and in section and plan in Fig. 182. It consists of a helical spring within the case shown, the upper end of this spring being attached to the piece *g*, which can be turned to vary the tension of the spring and clamped in place by the means shown. The lower end of the spring is attached to a lever *h*, and this connects with the link *i*, that bears against a pin as shown. Thus the wheel is made to always tend to move away from the work, so that no jarring or disturbance of any kind can make it move toward

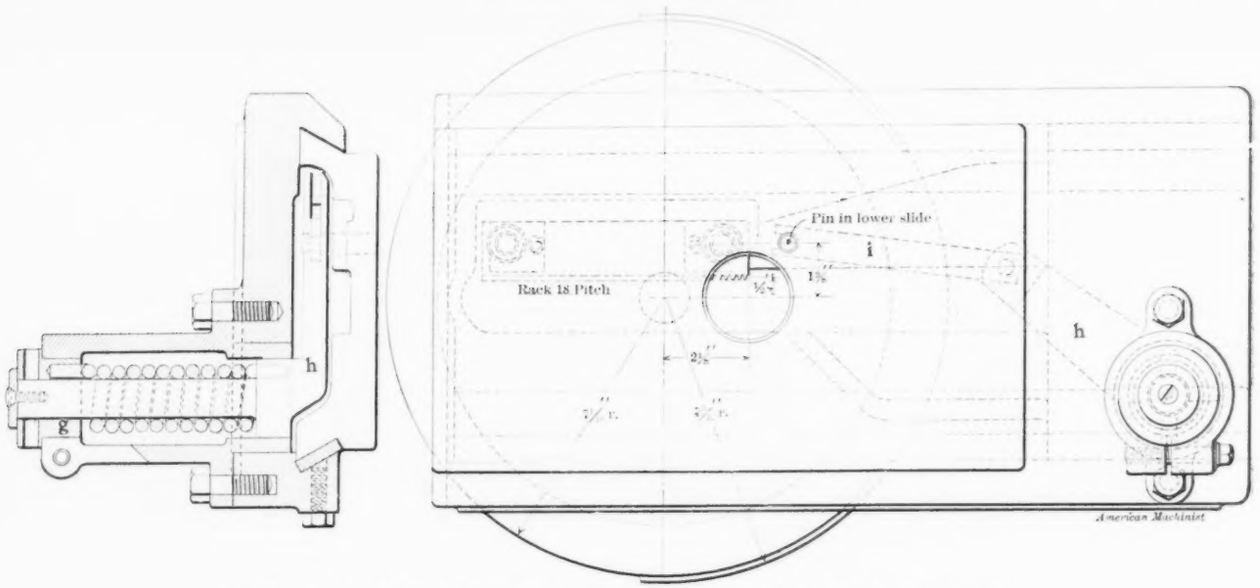


FIG. 182. PLAN AND CROSS-SECTION OF CROSS-SLIDE AND TAKE-UP OF LANDIS GRINDER.

the work, and the devices by which the wheel slide is moved can be adjusted to work quite freely, thus avoiding the disturbances that result from torsional stress upon them.

Fig. 181 shows also the automatic feed which can be put on to all recently constructed universal machines of the Landis make, and is provided regularly with all plain machines, such as is shown by Figs. 183 and 184; the first named being a front view of the No. 16 machine, and the latter a rear view of the same. This automatic cross-feed, which is shown in detail by Figs. 185 and 186, provides for the feeding in of the wheel at each reversal of the motion of the platen an amount determined by the operator in accordance with the nature of the work, varying from $\frac{1}{8}$ of a thousandth to 0.001 inch, reducing the diameter of the work by twice those amounts. The graduations of feed are by $\frac{1}{8}$ of a thousandth, and when the work has been reduced to a predetermined diameter this feed is automatically stopped; so that by this arrangement one man can attend a number of machines in manufacturing operations without danger of grinding a piece of work too small.

Referring to Fig. 185, *A* is a section of the platen and *B* of the bed of the machine. In this bed, at the left of the cross-section, will be seen a groove with beveled sides into which the block *j* fits and slides along with the platen, being moved with the platen by means of a roller on the lower extremity of the plunger *k*. At the right of Fig. 185 the roller which is on *k* is shown in the position it occupies in the shoe *j* when the platen is moving toward the left; the tendency then being rather to lift the shoe from the groove. But when the motion of the platen is reversed the shoe is not immediately reversed, but the roller mounts upon the incline at the right,

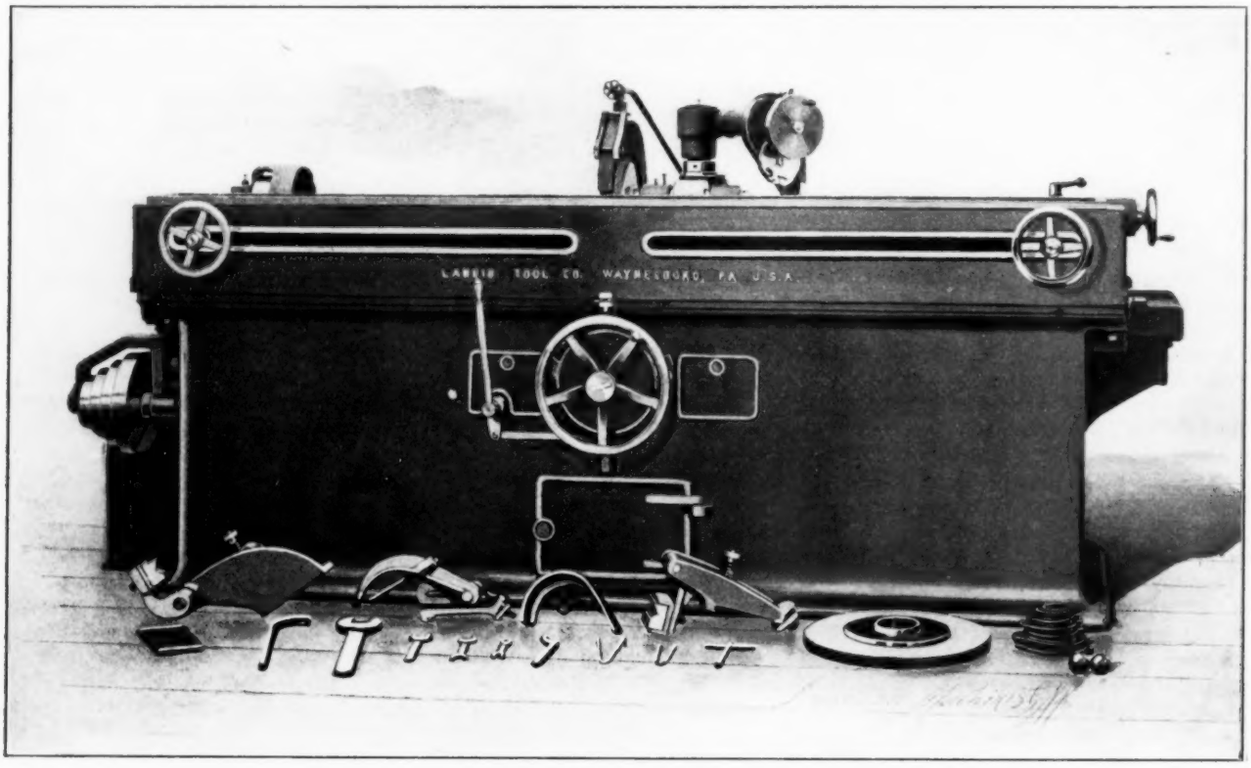


FIG. 183. PLAIN GRINDER.

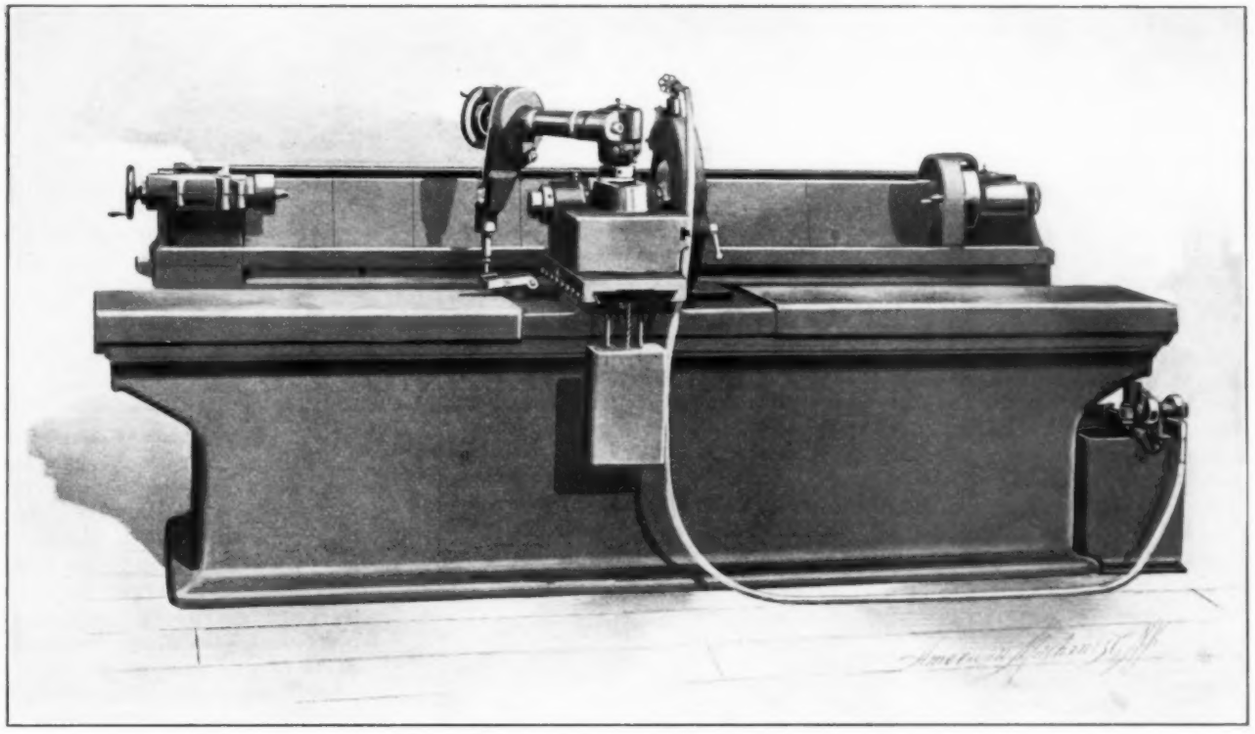


FIG. 184. PLAIN GRINDER, REAR VIEW.

and thus the plunger *k* is raised, falling again as the roller goes down the other side of the apex at the middle of the shoe; and when the roller contacts with the opposite inwardly inclined surface, the shoe is again moved with the platen until the next reverse occurs, when the same thing is repeated in the opposite direction. The plunger *k* being thus raised, a given distance at each reversal of the platen, operates to feed the wheel toward the work a varying amount, as determined by the setting of the screw *l*, which allows the bell-crank lever *m* to follow the downward motion of the plunger *k* only so far as may be needed to give the desired number of notches of feed; the bell-crank carrying at its upper extremity the pawl, which is in the form of a spring-lifted plunger-bolt with an edge adapted to engage with the teeth of the ratchet wheel above. This ratchet wheel is shown separately in Fig. 186. It is really a ratchet ring mounted upon the cross-feed hand-wheel and clamped to it by taper-headed screws.

Secured to the ratchet ring by being sprung over and upon a conical seat, as shown, is another ring, which carries a little lever *n* having a spring detent which engages with the teeth of the ratchet wheel. By applying the thumb and finger to this lever and moving it to the upper stop, the ratchet ring is advanced one notch, and this means that the wheel will be fed 1/8 of a thousandth farther before the automatic cross-feed is stopped; so that the operator, when he finds that the work is too large, either by reason of wear of the wheel or because the machine has not yet been adjusted to size, has only to press this lever as many times as the work is too large in quarter thousandths. For instance, suppose his micrometer shows that the work, when the automatic feed is thrown out, is still 0.001 inch too large, he presses the lever four times and again starts the machine; when the feed is again thrown out, the work will be right. The cross-feed is thrown out by the piece *o*, which, when it comes to the pawl, engages a small pin placed in the side of it and prevents it from engaging with the teeth of the ratchet ring.

Fig. 187 is a cross-section of the No. 16 machine showing the arrangement of the water courses and the protection from grit and water afforded to the seat for the head- and foot-stock. F. J. M.

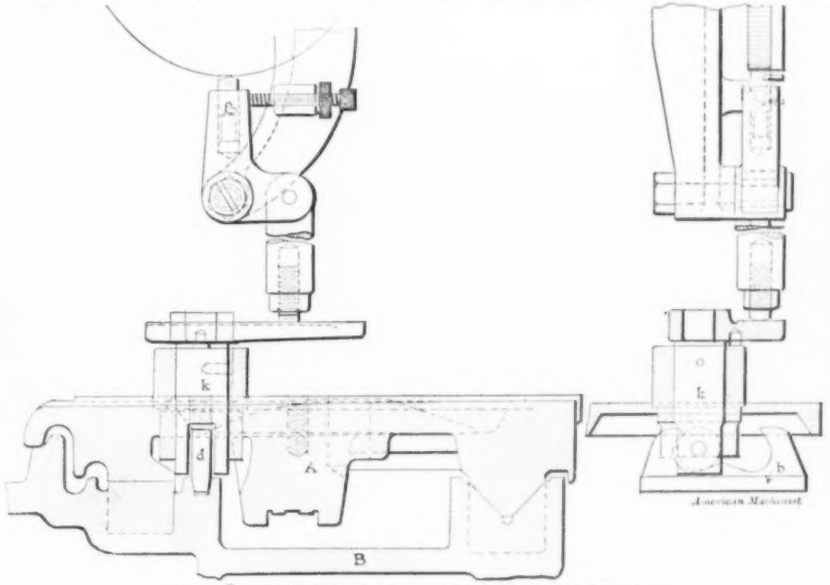


FIG. 185. AUTOMATIC CROSS-FEED OF LANDIS GRINDER.

Letters from Practical Men

Machinists' Hobbies.

Editor American Machinist:

The diversity of opinion among mechanics relative to machine tools is almost incredible. Each one seems to have his own particular hobby, and what is considered by one a good mechanical feature is criticised or condemned by another, few of them considering the general or compromise qualities of a machine. Of course, different kinds of work require different kinds of machines. A machine that would be too light for one might satisfy another who had lighter work to do. But this

is not the point where the disagreement occurs. If it was, the tool builders could easily remedy it by building a light and a heavy pattern, with a sprinkling of medium-weight machines between. The average mechanic appears to have an insatiable desire for something he never expects to find; and if he did find this, he would probably condemn it as a worthless contraption, and then build up a new creation in his mind. We might word this differently by saying that the American mechanic is progressive and is never satisfied; always struggling after the unobtainable, or for something which he believes will be an advancement. If the machinists of a generation or so ago had been content with the machines of their times and we had followed in their footsteps, what fine-looking tools we would have! But in general machinists are too prone to criticise only some part of a machine, which, when taken into full consideration, is really a benefit to it. There can be no doubt that it is easier to find fault than to commend, for the reason that the weak or faulty parts of a machine always seem to have a searchlight glare, while the good qualities—like good people—are of a modest and retiring disposition. The majority of machinists, in selecting or judging a machine, do not appear to be governed by the good or the bad qualities of it; it is their hobby they are after, and this is usually a something that the designer in his haste has overlooked or has considered unnecessary, or more probably what he would not put on the machine at any price.

Some of those hobbies assume a practical turn at times. A practical engineer has a steady rest hobby, and uses this attachment as a criterion of the entire lathe. If it has heavy jaws that do not project over the edge of the rest, and has a capacity to take almost what the lathe will swing over the carriage, this engineer looks for nothing else. He considers the machine that it belongs to a good one, and if the steady rest does not possess those features he would not purchase the machine that it belonged to at any price, claiming as his reason that any tool shop that would put a steady rest on a lathe without considering the many uses it would be put to, would pay as little attention to the other details of the lathe. Those who have had to cut off or to thread a 14 or 16-inch pipe on a 24-inch lathe will heartily appreciate his hobby.

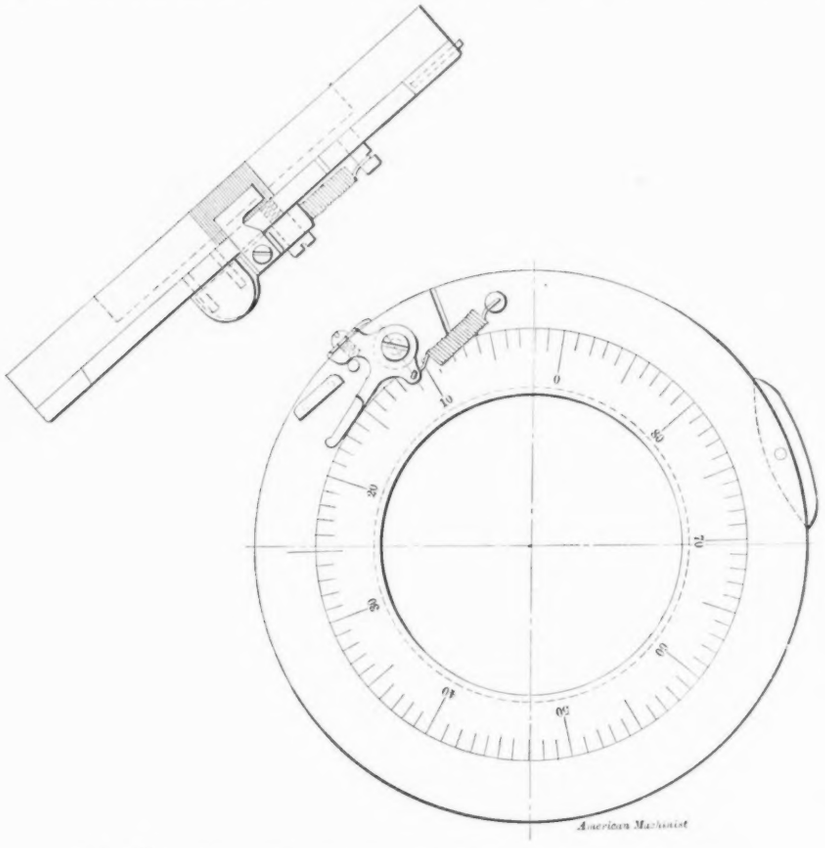


FIG. 186. MICROMETER FEED-WHEEL FOR AUTOMATIC FEED OF GRINDER.

While I do not wish to put myself on record as an emendator of machine tools, I am, like the average mechanic, afflicted with hobbies regarding them. One of these hobbies is consistency in machine design. It seems to me that most designers are not consistent in regard to power and resistance. The old style large planers usually had four driving shafts, light platen and one head, while the modern planer has the same number of driving shafts, an extra-heavy platen and generally three or four heads, and it still manages to get along better than the old one. It is quite different with the engine lathes. The designers of these have been increasing the gear ratio, by putting on larger back gears or double gears, and now quite a number of builders are putting triple gears on all lathes over 26 or 30-inch swing. In fact, the modern standard triple-geared lathe has power enough to almost twist the spindle off, and to resist this vast power it has still only one cutting tool. No doubt ample means are provided for an extra-heavy cutting tool, but all cutting tools have their limit, and to force them beyond this limit means their destruction.

Some time ago I came across a compound rest, as shown in the sketch. This

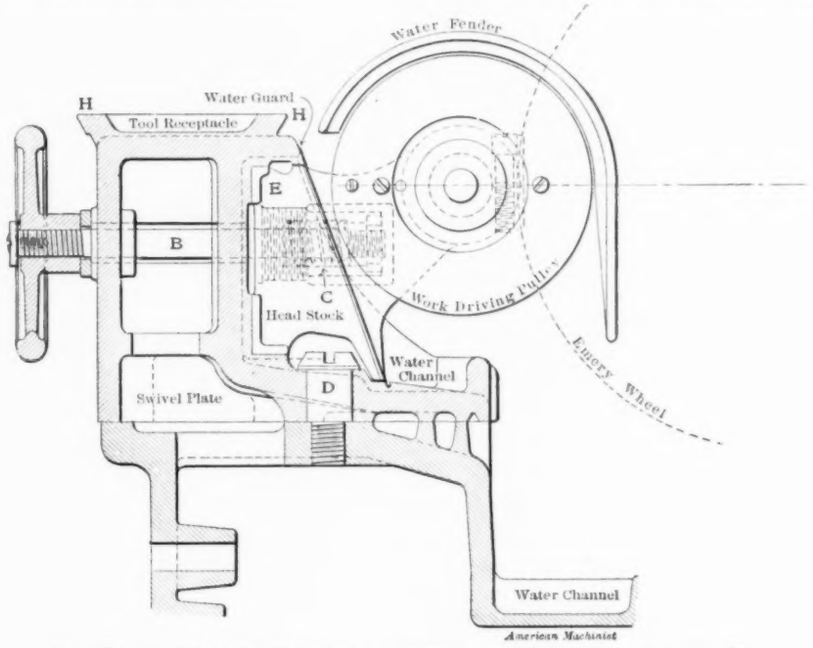
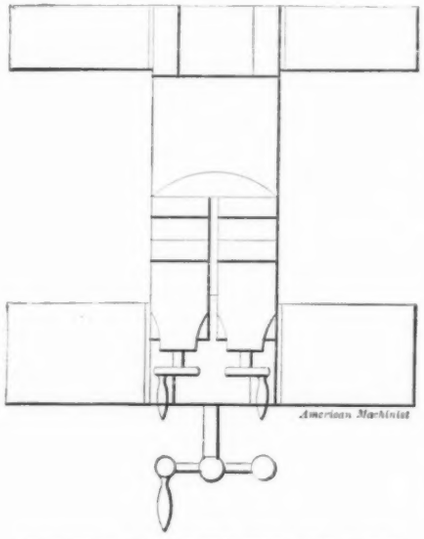


FIG. 187. TABLE CROSS-SECTION OF GRINDERS SHOWN BY FIGS. 183 AND 184.

rest was arranged for two tools, each independent of the other in transverse movement, but both swinging on the same axis, thus making it an easy matter for the operator to use it for turning or facing work. It appeared to me that this was a feature of some merit, especially on long lathes, as a roughing and a finishing cut could be taken at the same time. With a properly designed follow rest, I believe that a compound similar to the one in the sketch would give good satisfaction. The back tool rest with inverted cutting tool, while it gives uniform resistance on both sides of the work, is, to say the least, unhandy and in an out-of-the-way place, and at times hard to reach; not so on the double tool rest, as both adjustments are always within easy reach of the operator. T. B. C.



COMPOUND REST WITH TWO TOOL MOVEMENTS.

Timing the Ignitions of Gas Engines

Editor American Machinist:

The proper timing of the ignition of gas engines without the use of an indicator is a subject on which information is very meager and hard to obtain. The simple method and diagram here shown have resulted from a close study of quite a variety of types and makes while in the field of actual operation, and are intended as an aid to the common man—the man with an engine which goes lame and will not pull the load, by reason of the sparker not being rightly timed, and who perhaps never saw an indicator, or, if he has, they are beyond his reach financially or to borrow.

We will use a diagram for setting the sparker and the ear as an indicator to tell when we are right. I will refer here to the four-cycle engine, as the two-cycle is not much used for power purposes, and to electric ignition, as it is far more flexible than the tube and will supersede the tube entirely as perfection in sparkers and sparking devices is obtained. Some very satisfactory devices are now being applied to engines, although quite a few designers do not provide for more than one change from the starting point, and that a fixed point which in seven out of ten cases is not suited to the gas used, the speed run or the conditions of operation.

Much the best designs are those which permit of adjustment while the engine is running. No rigid diagram can be made to go by, as some gases are more prompt than others in reaching full ignition; some types or designs clear the products of combustion from the cylinder more effectually than others, rendering ignition more prompt and surer, and mixtures rich in gas are more prompt in ignition than weak mixtures. These are all factors to be borne in mind in using the diagram, which will enable one, with the use of his ears, to get very good results.

Referring to the diagram, it will be noticed that the sparker is set to spark at the center for starting the engine and is then given increased "lead" in proportion to increased speed. At a speed of 200 revolutions per minute the sparker is given 10 degrees "lead," at 250 revolutions per minute, 15 degrees, etc. By "lead" of sparker is meant the point at which the spark occurs on the finishing of the compression stroke of engine when running in the direction of the arrow. If the spark takes place after the crank wrist has passed the center line in the direction of the arrow, the engine gets lame and weak in direct proportion to the lateness and consequently wastes the fuel.

Suppose we are running a 60 horsepower engine at 200 revolutions per minute, and we have a sparker capable of adjustment. We start the engine with spark taking place on the center, and when it is up to speed we give our sparker 10 degrees "lead." Now is the time to use the ear as an indicator to determine if that is "lead" enough, or too much, or if the mixture is too rich. If the engine makes a metallic thumping noise as the explosion takes place, it is caused by the ignition being too early or the mixture being too rich in gas. First try cutting down the supply of gas (keeping a sharp ear on that thumping noise), and if that corrects it, all is well. If not, the sparker should be given less lead—that is, made to spark later or nearer the center—until the metallic thump just subsides. This is the point at which the engine will do its most satisfactory work, always being sure the sparker has lead enough or is early enough. Make a study of the sounds of the explosions (not the coughing of the exhaust) and watch the effect on the engine of any variations made on the sparker or mixture, and you will soon be able to make engines that are apparently weak pull a good load. Hit-and-miss governored engines will fire the first charge after a miss (by reason of a clearer chamber) more promptly than the succeeding charges; therefore the heavier the load the earlier should be the ignition of hit-and-miss governored engines.

Pittsburgh, Pa. FRED. C. TYGARD.

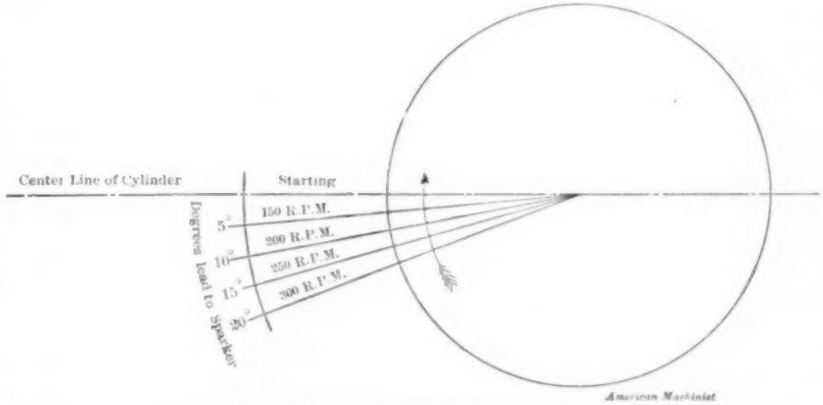


DIAGRAM FOR TIMING THE IGNITION OF GAS ENGINES.

Wiring Dies for Shell Work.

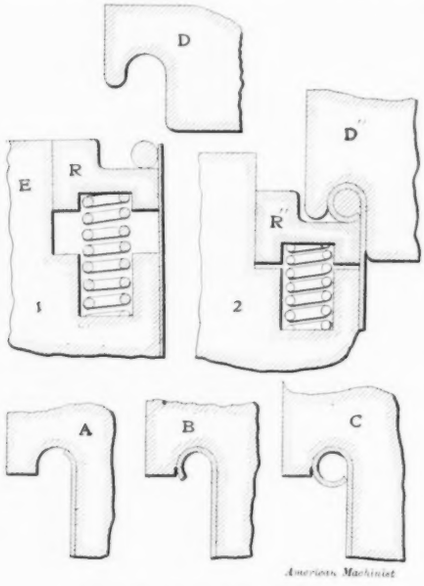
Editor American Machinist:

I have noticed the very complete illustrations you have recently published on die work, and have often wished I could take the time to furnish you with sketches of work in this line that I should hope would be interesting to the diemakers who read your paper. I have taken the time to send you sketches, and make a few remarks on wiring or curling dies for shell work. I call attention to an article by Mr. Jos. E. Woodworth, on page 290. Mr. Woodworth makes two operations in wiring the shell, where the same can be done in as thorough and practical a manner in one operation, much time being saved and the output very materially increased.

Wiring or curling dies, for wiring or curling either a genuine or a false wire, constructed as shown in 1 and 2, will produce practical results on round or oval shells or cylinders. The shape of the bottom does not affect the operation in the least, so long as it is properly supported. The section of punch *D* in 1 shows a portion of a tool-steel ring that can be put on and attached to the punch-

holder in either of various ways. The inner diameter of the ring *D* must be made to accurately fit the inner diameter of the shell or cylinder to be wired.

The depth of the wire must be made to suit the hight of the shell or cylinder, so as to bring the part to be wired or curled in the position shown by the sketch. If an actual wire is to be used, the ring *R* should be inserted in the die. This is held in its normal position by springs, and held to the proper hight by means of two or three screws with recesses made to allow the head to work up and down when pressure is brought to bear on the ring *R*. The wire is formed or rolled to fit the outer diameter of the cylinder or shell; the



WIRING AT ONE OPERATION.

shell or cylinder is inserted in the dies, and the wire is placed in position on the ring *R*. The press is then set in motion, and the result of the operation is shown in 2, where the punch *D*, the ring *R* and the die *E* are shown in the closed position with the finished wire or curled edge, and the wire marked *X* shown with the metal curled around it.

I have made numerous tests for wiring metal in this manner, and for forming a successful wire or curled edge with either an actual or a false wire, on metal as thin as 37 Birmingham gage and as thick as 15 Birmingham gage. The ring *R* serves a double purpose, and in the operation described by Mr. Woodworth would have been of great advantage, inasmuch as it would have lifted the shell free from the bottom part of the die, when it could have been easily and quickly removed by the operator.

The sketches *A*, *B* and *C* will clearly illustrate to the reader the principle of wiring or curling the edges of shells or cylinders. This has been illustrated in a book entitled "Press Working of Metal," written by Mr. Oberlin Smith. This book has been published a number of years and is a valuable work, and has been of service to many of us in solving some problems on sheet metal work. The sketches *A*, *B* and *C* show what we term a false wire or curled edge without the stiffening wire being inserted. When false wiring or curling only is required, it is not necessary to insert the spring ring referred to, as this ring is used only when holding the wire in position while the metal is being curled around it. HENRY J. HINDE.

Toledo, Ohio.

A System for the Stock Room.

Editor American Machinist:

The following is a very convenient method that I have seen used in whol sale hardware stores for keeping track of stock. The bins were arranged in long rows, and at the end of each row was a slate blackboard, about 4 feet square. On this blackboard, printed in white-lead, would be the names and the size of each article contained in that row of bins, and under the corresponding size and name of each article, marked with chalk, would be the number or amount of each article on hand, something like the enclosed sketch.

Whenever the stock-keeper or any of his assistants takes out or adds stock, it is marked on the blackboard, and in this manner the exact number or amount of each article contained in the bins is always known.

I think that this simple arrangement should be used more in the stock-rooms of large manufacturing concerns, as it is certainly simple and convenient, though not new. PHOS PHORUS.

	⅛	¼	⅜	½	⅝	¾	⅞	1⅛	1¼	1½
Boxes Hinges (Butts)	9			30	50	21				
Screws Boxes	17	23	40	70	20	30	140	150		
Air Cocks	50	200	70							
Oil Cups									30 x ¼	60 x ⅜

American Machinist

STOCK ROOM LIST.

Boring a Long Cylinder.

Editor American Machinist:

The way we bored a cylinder that was too long for our longest boring bar may interest other readers of the "American Machinist." The cylinder was 14 inches too long to be bored by our longest bar, so we bored as long as we could, starting the cut at the headstock, and then lengthened the bar. The bar had a long screw in the side and a traveling sleeve fed by a star on the tailstock end of the screw head. We took a piece of extra strong pipe and fastened it over the headstock end of the bar by four set-screws in the end of the pipe. In the other end of the pipe we drove a hardwood plug. We used a long center, and bored out the wood plug to fit the straight part of this center. The driver was fastened to the pipe, and we then had a bar long enough to finish the job. The tailstock was moved back to correspond, and the job was finished in first-class style. There was no ridge where the cuts joined. It would have been impossible to have changed ends with the cylinder and bored the 14 inches from the other end without leaving a ridge where the cuts joined. Of course, we were in a position where it was impossible to get another boring bar, and the cylinder was wanted in a hurry. M. C. JOHNSON.

A File Handle Suggestion.

Editor American Machinist:

The average wooden file handles and chisel handles are poor affairs, having for their principal disadvantage that the ferrule comes off so easily, by reason of the shrinkage of the wood. Generally, also, these ferrules are too narrow. The prevailing trick of prick-punching them, so as to give a grip on the wood at one point, is a miserable makeshift for thin ferrules, and hardly practicable for thick ones.

The best way to solve the ferrule problem (and with it very largely the handle problem) is to provide the handle with a light circular fillet, just above the cylindrical portion which is to receive the ferrule; to have this latter wide enough to extend up beyond the fillet, and after having expanded the ferrule sufficiently, over a part of its width, to enable it to fit over

A FILE HANDLE SUGGESTION.

the fillet, while fitting snugly the cylindrical part of the handle, to spin it down so as to fit the fillet also.

With such ferrules the wood cannot split nor the ferrule fall off; further, the tool tang has much less tendency to come out, especially if the latter be parallel instead of taper. ROBERT GRIMSHAW.

Dresden, Germany.

Power Calculations for Gas Engines—Erratum.

In Mr. Towle's article, published in our issue No. 15, page 410, third column, the formula for brake horse-power should read:

$$B.\ H.\ P. = \frac{D^2 \times (L+C) \times \left[\left(\frac{L+C}{C}\right)^{\frac{1}{3}} - 1\right] \times N}{1200}$$

Personal.

W. A. Waterman, who for a number of years was foreman at the Builders' Iron Foundry, Providence, R. I., has become general foreman of the Plunger Elevator Works, Worcester, Mass.

L. E. Johnson, general manager of the Norfolk & Western Railway, made an address before the engineering students of Purdue University, April 8. He spoke upon "The Duties of a General Manager," and showed the office to be no sinecure.

William Kent, M. E., will deliver a lecture before the students of Purdue University each day throughout the week, beginning April 15. He will speak to civil, mechanical and electrical engineers, and will choose for his subjects various topics drawn from his engineering experience.

L. Copleston, who for eight years has been in the field as an engine salesman and for several years past was New York manager for the Watertown Engine Co., has been made general sales manager for that concern and will be located at the New York office, 39 Cortlandt street.

Obituary.

William M Levering, senior member of Levering & Carrigues, manufacturers of structural iron, Philadelphia, died in that city April 6, forty-seven years old.

Jacob Lodge, a retired master machinist, died in Philadelphia April 6, eighty-four years old. He learned the machinist trade and for many years conducted a shop on Chestnut street, Philadelphia. He invented a "bank note roll," which has been used by the U. S. Treasury Department in making bank notes.

Herrmann Schum, managing and technical director of the parent "Otto" Gas Engine Company, died at Bonn, Germany, April 3, sixty years old. Mr. Schum was born at Stuttgart and attended various technical schools until his twentieth year when he entered a locomotive and general machine works at Carlsruhe, and remained there most of the time for ten years. He was in the machine works of Charles Beer, at Jeweppe, Belgium, for a time, and for some years he was manager of a large iron foundry at Strasburg, but in 1876 he became interested in the Otto engine to which he thereafter devoted his energies. He was one of the corps of engineers commissioned by Dr. Otto to work out the mechanical details and settle the standard design of the engine, and the efficiency of his work is evidenced in the few changes that have been made and in the extent to which the original model has been followed by others. Mr. Schum visited Philadelphia in 1877, and as a memento of his activity here left his name in the firm of Schleicher, Schum & Co., which name was retained until the incorporation of the Otto Gas Engine Works in 1894. Later Mr. Schum built extensive works in Paris. In 1882 he was appointed technical director of the parent company at Deutz. While most exacting in business, Mr. Schum was of a liberal disposition and jovial temperament and made many friends.

The Manufacturers' Association of Kansas City, Mo., has established a catalog library, and requests all manufacturers and mercantile establishments to forward their catalogs, receipt of which will be duly acknowledged, and which will be filed and indexed, both as to firm name and subject matter. The library is at the service of anyone, and inquiries by mail which can be answered by reference to it, will be freely replied to.

The eighty-first meeting of the American Institute of Mining Engineers will be held at the city of Mexico early in November, 1901. Theodore Dwight, assistant treasurer, has personally undertaken to organize a party of a limited number of members and guests to go to Mexico by special train, starting about November 1 and returning about December 1, and visiting many points of interest in the country. The cost will be $250. Mr. Dwight's address is 99 John street, New York.

Manufacturers.

A plant will be located at Frankton, Ind., to make the mower designed by E. B. Hussey, of Pendleton.

The Montague Manufacturing Company,

(Continued on next page.)

Miscellaneous Wants.

Advertisements will be inserted under this head at 25 cents a line, each insertion. Copy should be sent to reach us not later than Saturday morning for the ensuing week's issue. Answers addressed to our care will be forwarded.

Gear Wheels, gear cutting. Grant; see p. 24.

Caliper cat. free. E. G. Smith, Columbia, Pa.

Forming lathes. Mer.Mach.T.Co.,Meriden,Ct.

Punches & dies. Wal.M.Wks.,Waltham,Mass.

Wanted—Gray iron castings to make. Patt. Bros. & Co., Marietta, O.

Light and fine mach'y to order; models and elec. work specialty. E. O. Chase, Newark, N. J.

Book "Dies and Diemaking," $1, post paid. J.L.Lucas,Bridgeport,Ct. Send for index sheet.

Parallel drawing-board attachments; by mail, $1.50; circulars. F. G. Hobart, Beloit, Wis.

F. J. Stokes Machine Co., 13th and Noble sts., Philadelphia, Pa., build light machinery.

Light and medium patterns and machinery built to order. W. L. Mead, South Orange, N. J.

Selden Packing for Stuffing box, with or without rubber core. Randolph Brandt, 38 Cortlandt st., New York.

For positions in charge, or competent men for such positions, address James Brady, 220 Broadway, New York City.

Special machinery, models, punches and dies; experimental work; accurate work. C. L. Pierce, Machinist, Gardner, Mass.

Wanted—To contract with some well-equipped machine shop for the manufacture of a light specialty. Box 23, AMER. MACH.

General machinery improved; mechanical devices invented; inventions perfected; all work sent subject to examination. J. B. Murphy, Bayonne, N. J.

A new International time recorder, clock and racks complete; will be sold at a low figure. Address F. A. Verdon Co., 45 & 47 14th st., Hoboken, N. J.

Threads and gears; easy rules to cut any thread possible to be cut in the lathe, without algebra, sent to any address for 25c. by G. W. Dixon, Spring Lake, Mich.

Wanted to Manufacture.—A specialty to manufacture in cast iron, requiring little or no machining, is desired. "Pennsylvania," care AMERICAN MACHINIST.

Machinery to build; drawings, patterns, castings, forgings to order; inventions perfected; private rooms for experimenting. "Manufacturer," Box 886, New Haven, Conn.

Institutions retiring from business having machine tools, brass and wood working machinery will find it to their interest to correspond with us. We purchase complete plants or handle them on com. C. C. Wormer Mach. Co., 55-59 Woodbridge st., W., Detroit, Mich.

Wants.

Situation and Help Advertisements only inserted under this head. Rate 25 cents a line for each insertion. About six words make a line. No advertisements under two lines accepted, and no advertisements abbreviated. The cash and copy should be sent to reach us not later than Saturday morning for the ensuing week's issue. Answers addressed to our care will be forwarded. Applicants may specify names to which their replies are not to be forwarded; but replies will not be returned. If not forwarded they will be destroyed without notice. Original letters of recommendation or other papers of value should not be inclosed to unknown correspondents.

Situations Wanted.

Mechanical draftsman wishes position. Address Box 41, AMERICAN MACHINIST.

Competent machine shop foreman open for engagement. Box 27, AMERICAN MACHINIST.

Toolmaker, first class, wishes responsible pos't on; designs tools and jigs. Box 42, AMERICAN MACHINIST.

An experienced foreman on engines and general machine shop work desires position. Box 9, AMERICAN MACHINIST.

Position wanted by first-class operator on Brown & Sharpe grinder. Address "Grinder," 211 Austin st., Worcester, Mass.

An experienced foreman on engines and general repair work desires position; good references. Box 43, AMERICAN MACHINIST.

Wanted—Position by draftsman, experienced on mechanical and electrical machinery; A1 references. Box 36, AMER. MACH.

A young man, 18, would like to learn machinist's trade, where wages are sufficient to pay his board. Box 28, AMER. MACHINIST.

Situation wanted by a brass foundry foreman; an expert metal mixer; a steady and capable man. Address Box 30, AM. MACH.

Jones & Lamson flat turret lathe; machinist operator open for engagement; mention wages paid. Box 29, AMERICAN MACHINIST.

Assistant manager, now with large concern soon to be closed by trust, desires position with industrial iron works. M. P. G., care AMERICAN MACHINIST.

Having left my former position, I should like to hear from parties wishing a competent iron foundry superintendent or foreman. Box 416, AMERICAN MACHINIST.

(Continued on next page.)

(*Continued from preceding page.*)

sawmill, St. Albans, Vt., is building an addition to its plant.

It is stated that a mill is to be built at Canton, Me., by the Oxford Paper Company, of Rumford Falls.

It is understood that C. D. Orr, Osage, Ia., will have an elevator built at Northfield, Minn., or thereabouts.

The Grant-Ferris Company, manufacturer of agricultural implements, Green Island, N. Y., is enlarging its plant.

The Laing Packing & Provision Company, Montreal, P. Q., is to erect an abattoir, including a 112x40-foot power plant.

The Youngstown (O.) Foundry & Machine Company is contemplating building a new foundry, doubling its present capacity.

Plans have been filed at Buffalo, N. Y., by the Iron Elevator & Transfer Company for a $100,000, 750,000-bushel grain elevator.

The Morris Electric Company, 15 Cortlandt street, New York, will build, in New Jersey, a 250x80-foot machine shop and a foundry.

Fire at Salem, Mass., has destroyed a sash mill, box factory, etc., belonging to N. P. Gifford, and a box factory of Wm. A. Irving.

Plans have been completed by the Gerry Engine Company, of Bethlehem, Pa., for a large brick machine shop and factory building.

A permit has been granted the Buhl Malleable Company for a machine shop building at 186-196 Wight street, Detroit, Mich., to cost $5,000.

The Heller Tool Company, at Woodside, Newark, N. J., will shortly enlarge its machine shop by an extension of 60 feet and two stories high.

It is thought that the works at Crumlynne, Pa., of the Crumlynne Iron & Steel Company, Philadelphia, which were destroyed by fire, will be rebuilt.

Fire, April 9, destroyed the plant of the Shreveport (La.) Ice & Refrigerating Company. The loss is estimated at $150,000. It will be rebuilt.

The Lake Erie Asphalt Block Company's plant at Ironville, Toledo, O., has been destroyed by fire. It will be rebuilt, with an increased capacity.

J. I. Curtis has been granted a permit for the erection of a plant, 120x317 feet, for the manufacture of salt, at Military avenue and the Wabash Railroad, Detroit, Mich.

The oil refinery of the National Cotton Oil Company, Houston, Tex., will be rebuilt, and a soap factory added. The working capacity of the oil refinery will be 100 barrels daily.

The firm of Schellenbach & McCrosky, manufacturers of universal adjustable reamers, 208 Lawrence street, Cincinnati, O., has become Schellenbach, McCrosky & Huber.

The Bethlehem Steel Company has removed its St. Louis office from 930 North Main street to 510 Security Building, where it will continue to be represented by S. E. Freeman.

It is reported from Stevens Point, Wis., that Dr. H. E. Horton has purchased the McDill water power on the Plover River, and proposes to erect a paper mill, to employ 100 men.

Cheney Brothers, South Manchester, Conn., have let the contract for two new velvet mills to Beatty & Wilcox, of Fall River, Mass. Each will be 50x330 feet, three stories and basement.

D. W. Aylworth, inventor and owner of the "Anchor" fence, was recently reported in Lexington, Ky., with the object of interesting local capital and of establishing a factory there.

(*Continued on next page.*)

Situations Wanted—Cont'd.

Mechanical draftsman, technical graduate, wants change to steam engine or locomotive work. Address S., 4 Grandview ave., Duquesne Heights, Pittsburgh, Pa.

A first-rate diesinker wants re-engagement as superintendent or foreman in drop-forge concern; experienced; good reference. Address Box 37, AMERICAN MACHINIST.

Expert on gas engines and automobiles, college graduate, good practical experience, open for position as chief engineer or chief draftsman. C. D., care AMER. MACHINIST.

Mechanical engineer, resourceful, inventive, accustomed to designing special tools, and up to date in shop practice, open for position May 1. Address Box 8, AMER. MACHINIST.

Technical graduate, 10 years' shop experience, 4 years drawing office, can handle men, would accept position in England; A1 references. Box 31, AMERICAN MACHINIST.

Practical machinist wants position as foreman of shop or toolroom, in New York or Brooklyn; wages to commence no object; has position; wishes change. Box 38, AM. MACH.

Young man, technical graduate, desires position at office of bridge builders, or similar; thoroughly experienced in designing and calculating steel structures of every kind. Box 33, AMERICAN MACHINIST.

A thorough and experienced mechanic, of exemplary habits, wants position as foreman or superintendent; well up in marine, mining, locomotive, blast furnace and mill work. Address Box 39, AMERICAN MACHINIST.

Up-to-date cost clerk and factory accountant wants position; knows shop methods; can organize and direct factory systems; now employed, but dissatisfied; new plant in West preferred. "Experienced," care AMER. MACH.

Mechanical engineer, owning patents and drawings of an internal combustion engine, desires position with engine builder who will manufacture same for the blast furnace producer and natural gas trade on a royalty. Box 11, AMERICAN MACHINIST.

Mechanical engineer, first-class, energetic man, college graduate, good practical experience, expert on gas engines and automobiles, is open for position as manager, chief engineer or chief draftsman. Address Sumner H. Doulton, 66 Broadway, New York.

Young man, 15 years' experience, general foundry and machine business, power transmission a specialty, understands all details, 5 years foreman, technical education, best of references, well acquainted with the trade, is open for an offer. Box 40, AMER. MACHINIST.

Wanted—Position as superintendent or foreman of machine shop in Southern or Western part of United States; is able to build and design tools, jigs and special machinery; understands repair work of nearly all kinds; can handle men in first-class manner; is a hustler and can give the best of references. Box 32, AMERICAN MACHINIST.

Help Wanted.

Wanted—Experienced diemakers. Address Stanley Electric Mfg. Co., Pittsfield, Mass.

Wanted—Competent machine shop foreman. American Blower Co., Detroit, Mich.

Wanted—A1 draftsman, familiar with Corliss and air-compressor work. Box 19, A. M.

Machinists.—Wanted—Two or three first-class, all-around machinists. Gifford Bros., Hudson, N. Y.

Wanted—A first-class man to run a universal grinder. Address the Cincinnati Milling Machine Co., Cincinnati, O.

Wanted—Two first-class machinery draftsmen. Apply at once to the Wagner-Palmros Mfg. Co., Fairmont, W. Va.

Wanted—Wood pattern makers; steady employment. Address, stating experience, General Electric Co., Schenectady, N. Y.

Wanted—Brass molder, thoroughly competent to mix as well as mold. Address Bundy Mfg. Co., Binghamton, N. Y.

Skilled machinists wanted: milling machine, lathe and vise hands. Automobile Co. of America, Marion, Jersey City, N. J.

Wanted—Experienced, first-class foreman for valve and machine shop. Address, with references, "Valve," AMERICAN MACHINIST.

Wanted—Machine tool salesman for old-established house; young man with technical education preferred. Address Box 439, AM. M.

Wanted—First-class draftsman on steam-engine work; must have good knowledge of Corliss details. Address P. O. Box 548, Chicago, Ill.

Wanted—Experienced turret lathe operators; give references, experience and wages expected. American Turret Lathe Co., Wilmington, Del.

Draftsman wanted; a young man, capable of advancement, to work in drawing room in shops 15 miles out of New York. Box 34, AMERICAN MACHINIST.

Wanted—Man competent to take care of the lathe work on printing press cylinders; state age and experience. Address Box 26, AMERICAN MACHINIST.

Toolmakers, patternmakers and general machinists wanted for new shop in city of 80,000, located central New Jersey. Box 21, AMERICAN MACHINIST.

Wanted—Experienced die and tool maker and designer; capable of cheapening cost of production, metal specialties. The Enterprise Mfg. Co., Akron, Ohio.

Wanted—Electrical draftsman in large electrical factory. Apply, stating experience, age, wages expected, to the Canadian General Electric Co., Ltd., Peterboro.

Experienced operators for forging machines and bulldozers for blacksmith shop department, also machine hands for machine shop. Box 5, AMERICAN MACHINIST.

Wanted—Machine tool salesmen for Pittsburgh and vicinity; must be capable, energetic and steady; good situation for right parties. Particulars, Box 6, AMER. MACH.

Draftsman wanted; one who thoroughly understands steam hammers and hydraulic machinery; state experience in full and what salary desired. Box 25, AMER. MACHINIST.

Wanted—Draftsman accustomed to designing machinery; must be accurate and of good habits; one acquainted with printing machinery preferred. Address "Cube," care AM. M.

Wanted—A working foreman for gasoline engine factory; must be thoroughly experienced, up to date and pushing; good opportunity; give experience and references. Address Box 2, AMERICAN MACHINIST.

Engineer's License.—Mecanics, engineers, firemen, electricians, etc.; 40-page pamphlet containing questions asked by Examining Board of Engineers; sent free. Geo. A. Zeller, Publisher, Room 316, 18 S. 4th st., St. Louis, Mo.

We are enlarging our works, and will shortly require an increased number of skilled mechanics; we invite application from pattern makers, molders and machinists. Address the Westinghouse Machine Company, East Pittsburgh, Pa.

A company building a high-grade machine tool wishes to engage a traveling salesman who, by application to one line, can become a specialist; no one who has not a record as salesman of machine tools need apply; we are prepared to pay a good salary to a man who can produce results; all communications will be strictly confidential. Box 44, A. M.

Wanted—General shop superintendent; ex-

Draftsmen Wanted.

WE have positions open for capable, experienced Mechanical Draftsmen. Our business is to assist Draftsmen and Engineers (technical men only) to secure positions when unemployed, and to better their positions when employed. Our business was established in 1893.

Address THE ENGINEERING AGENCY,

1805 Monadnock Block. CHICAGO.

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First-class, experienced mechanical draftsmen wanted at once; some of them acquainted with electrical work; those with shop experience preferred. Apply, by letter, to Chief Draftsman, P. O. Box 911, Pittsburgh, Pa., stating experience in full and giving references.

Wanted—A competent mechanic, to supervise and keep line shafting, hangers and machines in good running order and repair, in iron and brass works employing 200 men. Address the Ohio Brass Company, Mansfield, Ohio, giving experience, references and wages wanted; position permanent.

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Wanted—A working foreman, diemaker and designer, in a light specialty Western stamping concern; must be thoroughly competent, a systematizer and possessed of executive abilities and able to furnish the best of reference; state experience, age and if married or single and the least salary wanted. Address Box 35, AMERICAN MACHINIST.

Wanted—A young man to take charge of toolroom; must be a good designer of jigs and tools, able to handle a small number of men successfully and get work through rapidly and economically; a man having a knowledge of sheet metal working tools preferred; applicant should state age, previous experience, pay expected, etc. Address Box 4, A. MACH.

NOTICE Mr. Gus. C. Henning, New York, announces that the contract between himself and Messrs. Riehle Bros. Testing Machine Company, of Philadelphia, for the sale of the **Henning Pocket Recorder** is cancelled, and that the said Company has no longer the right to sell the apparatus. Anyone purchasing the apparatus from the above Company will be liable to a suit for damages for infringement of patent rights.

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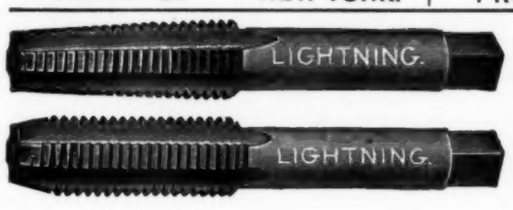

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(Continued from preceding page.)

An explosion, thought to have occurred in a sawdust bin, at the plant of the Montgomery Door & Box Company, Buffalo, N. Y., ruined the pumps and damaged other machinery.

The Morava Construction Company has begun the erection of a plant, 150x110 feet, for the manufacture of bridges and steel frame work, at Eighty-fifth street and Stewart avenue, Chicago.

The Safety Armorite Conduit Company, whose works at Rankin, Pa., were destroyed by fire several months ago, is about to erect a building, 200x50 feet. The plant will employ 200 men.

The Papio Machine Company is constructing a foundry, machine shop, grinding room, blacksmith shop, etc., at Lima, N. Y., to manufacture machinery for cutting and elevating ensilage.

The Delaware, Lackawanna & Western Railroad Company is to construct a new self-feeding boiler plant at Scranton, Pa., which will, it is said, displace the labor of twenty-five or thirty men.

The Carpenter Manufacturing Company, Kenosha, Wis., has secured a five years' lease of the factory buildings to be erected by the Kenosha Construction Company, and will manufacture fancy furniture.

The Danielsonville cotton mill, Danielson, Conn., has been sold to the Cochrane Manufacturing Company, of Dedham, Mass. It is reported that the new owners will enlarge the plant and put it in operation at once.

Owing to increase of business at Chicago, the Bethlehem Steel Company will on May 1 move its offices in that city to larger quarters, in rooms Nos. 1520 and 1521 Marquette Building, where it will continue to be represented by E. Nelson, sales agent.

The Pneumatic Elevator & Weigher Company has purchased the factory formerly owned by the American Casket Company, at the corner of Morris street and the Pennsylvania Railroad, Indianapolis, and will equip it with the best appliances.

It is reported that Brown Bros., of Winchendon, Mass., manufacturers of woodenware, etc., will soon build another mill, and will have the Loud Manufacturing Company, maker of faucets, and M. H. Parks, manufacturer of barrel covers, for tenants.

The erection of a new iron foundry at Lachine, P. Q., has been begun by the James Cooper Manufacturing Company, of Montreal, for the manufacture of mining machinery. The cost of the enterprise will be about $250,000, and it will employ some 300 or 400 hands.

It is reported that the Cleveland, Cincinnati, Chicago & St. Louis Railroad has appropriated $100,000 to be used in enlarging the shops at Bellefontaine, O., and erecting car-building and paint shops. It is said that by this time next year locomotives will be built there.

Surveyors of the Wheeling & Lake Erie Railway have begun to lay off ground for the enlargement of the company's shops at Norwalk, O. The plans contemplate ten new stalls for the roundhouse (doubling its present capacity), a new machine shop, 80x150 feet, and much new machinery.

The Buckeye Match Company is being organized at Akron, O., by parties, including M. J. Mandelbaum and L. J. Wolf, of Cleveland, O., and J. P. Loomis, of Akron. The company will erect a factory in Akron and will not only manufacture matches, but will make machines to be sold to concerns outside of the trust.

A new salt plant will be established at Le Roy, N. Y., by Buffalo parties. The company

is to be known as the Western New York Salt Company, with head offices at Buffalo, and will be capitalized at $100,000. Christian Klinck has been chosen president; Jacob Dold, vice-president, with members of the Jacob Dold Packing Company and Nathan Wolff as directors.

The Philadelphia Pneumatic Tool Company informs us that, owing to the steadily increasing demand for its tools, it has found it necessary largely to increase its shops; so that it now has a frontage on Ridge avenue, Eleventh and Noble streets, and for greater convenience and larger offices will remove on April 10 to No. 1038 Ridge avenue, corner of Noble street.

The Cincinnati Planer Company, of Cincinnati, O., is pushing its new building to completion, and expects to have it ready for occupancy by June 1. This is an addition to its present plant, and will give a total floor area of about 25,000 square feet. The buildings are one story, brick, fitted with traveling cranes, and are well adapted to the building of heavy tools.

The Washburn-Crosby Company, manufacturer of flour, Minneapolis, Minn., has closed a contract with the Barnett & Record Company for the construction of an elevator to be operated in connection with the St. Anthony elevator in Southeast Minneapolis. It will consist of ten tanks with a capacity of 150,000 bushels each. No wood is to be used. In connection with the elevator will be a workhouse of 150,000 bushels capacity.

The S. Obermayer Company, manufacturer of foundry facings and supplies, of Cincinnati, Chicago and Larimer, Pa., has remodeled its Larimer plant, installed new machinery and doubled the capacity. At this plant it makes a specialty of the manufacture of bituminous or coal facings, and its capacity is now 100 tons per day. The S. Obermayer Company reports business good, and says its three plants are now running to full capacity.

The main building of the B. F. Sturtevant Company, at Jamaica Plain, Mass., was burned, April 14, at a loss estimated at $350,000. The company had lately added $75,000 worth of tools and machinery. Among machinery in course of construction a number of engines and blowers for use on naval vessels were destroyed. Over 700 men are thrown out temporarily; but it is stated that the business will be carried on without much delay.

It is rumored that a big plant for the manufacture of insulated copper wire is to be located in Newark, N. J.; that three of the principals are affiliated with the United States Steel Corporation; that a site has been procured and that $1,000,000 will be expended on the plant. Orders for machinery are said to have been placed. The new company will, it is said, have a capital of $10,000,000, employ fully 3,500 hands and use a patent process for insulating wire.

The Ordway Manufacturing Company, of South Framingham, Mass., has made arrangements to establish in Bristol, Va., at a cost of some $50,000, a plant for the manufacture of stock for fancy chairs and decorative work, including wooden ropes, twisted woods and wood reeds as a substitute for ratan. The buildings will include an electric power plant, 50x100 feet, having space for 600 horse-power, the purpose being to furnish power to manufacturers who locate there to use the Ordway Company's stock.

John R. McGinley has purchased the capital stock of the Duff Manufacturing Company, whose works are on Marion avenue, Allegheny, Pa. The capital amounts to $300,000, and Mr. McGinley will begin at once the doubling of the plant's capacity. Special machinery will be installed and improvements

(*Continued on next page.*)

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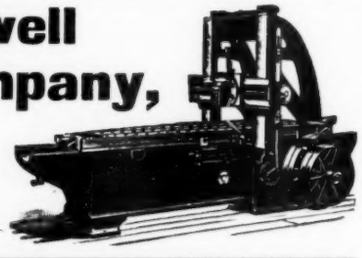

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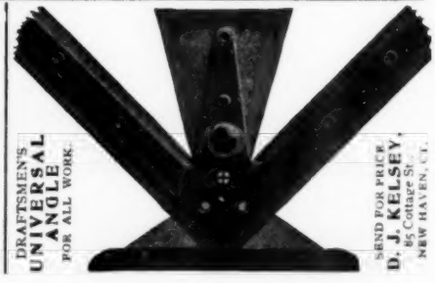

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